National Institute for Health and Care Excellence

Guideline version (Draft)

Indoor air quality at home

[2] Evidence review for exposure to pollutants and health outcomes

NICE guideline <number>

Evidence review

[June 2019]

Draft for Consultation

These evidence reviews were developed by Public Health Internal Guideline Development team

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ISBN:

Exposure to pollutants and health outcomes

Review question

What signs and symptoms should prompt healthcare professionals to consider exposure to poor indoor air quality at home in people presenting to health services?

Introduction

People spend up to 90% of their lives indoors and 60% of that time at home. To minimize the health risks from pollutants occurring in homes, exposures to these pollutants should be controlled. The priority in this is to control the source of the pollutant and so reduce exposure. Often, especially in existing buildings, this may be difficult to achieve, in which case pollutant exposures should be controlled by providing enough ventilation air to dilute and remove the contaminants.

Recent reviews suggest that adequate ventilation results in more than 0.4 air changes per hour (Wargocki 2013) and that home ventilation ratios greater than 0.5 air changes per hour was associated with better health outcomes (Sundell 2010).

The aims of this review are to Identify clinical signs and symptoms that are associated with exposure to poor indoor air quality at home.

PICO table

Table 1 outlines the PICO elements of the review protocol which are available in Review protocol in Appendix A:

Table 1: PICO table for signs and symptoms

Eligibility criteria	Content
Population	People in all dwellings
Prognostic factors	• Clinical signs / symptoms associated with exposure to indoor air pollutants at home including: • Neurological symptoms for example: headache, drowsiness, fatigue, poor concentration, confusion • Respiratory symptoms for example: coughing, sneezing, wheezing, sinus congestion, phlegm, sore throat, nasal congestion, runny nose • Cardiovascular symptoms for example chest pain, shortness of breath • Nausea • Eye irritation • Signs and symptoms of immune response disorder for example asthma, allergic rhinitis, dermatological conditions for example atopic eczema, psoriasis

Eligibility criteria	Content
	• Pregnancy related for example low birth weight for gestational age, premature birth, infant mortality (but not sudden infant death (SID)), stillbirth
Outcomes	Risk ratios, odds ratios of exposure to indoor air pollutants at home

Methods and process

This evidence review was developed using the methods and process described in Developing NICE guidelines: the manual. Methods specific to this review question are described in the review protocol in Appendix A:.

As review questions 1 (individual and building factors associated with exposure to poor indoor air quality at home) and 2 (signs and symptoms should prompt healthcare professionals to consider exposure to poor indoor air quality at home) overlapped, both reviews were carried out using a single search. The results of this search were then parsed as follows

- Studies that examined the association between individual and building characteristics and health outcomes
- Studies that examined the association between sources of pollutants and health outcomes
- Studies that examined the association between exposure levels and health outcomes.

This review is concerned with the association between sources of pollutants or exposure and health outcomes. Please see Evidence review 1 for the association between individual or building characteristics and exposure levels.

Declarations of interest were recorded according to NICE's 2018 conflicts of interest policy.

Public health evidence

Included studies

33967 references were identified from literature searches outlined in Appendix B. 426 papers were ordered in full-text for questions 1 and 2. Of these 2878 were excluded from both reviews and 148 articles in total were included in the two reviews. 99 studies from 101 articles and 31 studies from 32 articles were included in the two parts of this review respectively and 15 studies from 16 papers were included in evidence review 1.

Excluded studies

The full list of excluded studies and reasons for exclusion are in Appendix I:

Quality assessment of studies included in the evidence review

For this review question, cohort studies were considered to be of highest quality and case control studies as next best evidence quality. Evidence quality started as 'high' for cohort studies and 'low' for case control studies.

See Appendix F:for the full GRADE tables.

Association between individual and building characteristics and health outcomes

Summary of public health studies included in the evidence review

A summary of the characteristics of the included studies are in the following table

Table 2: Characteristics of included studies

Study (country)	Design	Population	Characteristic	Outcomes	Risk of bias
1. Bajeux 2014 (France)	Prospective cohort	Pregnant women	Domestic products	Wheeze, Eczema, Food allergies	High
2. Baker 2006 (US)	Prospective cohort	Children	Heating fuel	Lower respiratory illness	Low
3. Bedard 2014 (France)	Nested case-control	Women with asthma	Domestic products	Asthma,	Moderate
4. Belanger 2003 (US)	Prospective cohort	Infants at risk of asthma, Infants not at risk of asthma	Gas stove, House dust, Pets, Mould / mildew	Wheeze, Persistent cough	Moderate
5. Belanger 2006 (US)	Prospective cohort	Children with asthma	Gas stove, Gas dryer	Wheeze, Persistent cough, Shortness of breath, Chest tightness	Moderate
6. Bhinder 2014 (Canada)	Retrospective cohort	Adult lung transplant recipients	Proximity to traffic	Chronic lung allograft dysfunction	Moderate:
7. Bornehag 2005 (Sweden)	Nested case-control	Children with respiratory symptoms	Ventilation rate	Asthma and allergic symptoms	Moderate
8. Bowatte 2017 (Australia)	Prospective cohort	Adults	Proximity to traffic	Asthma, Wheeze	Low
9. Brunekreef 1989 (US)	Prospective cohort	Children	Damp / mould	Wheeze, Cough, Bronchitis, Chest illness, Lower respiratory illness, Asthma, Hay fever, Non-chest illness	High
10. Cable 2014 (UK)	Prospective cohort	Adults	Damp	Cough, Phlegm	High
11. Carlsten 2010 (Canada)	Prospective cohort	Children at risk of asthma	House dust, Pets	Asthma	Low
12. Casas 2012 (Germany)	Prospective cohort	Children	Damp, Gas stove, Pets	Asthma, Persistent wheeze	High

Study (country)	Design	Population	Characteristic	Outcomes	Risk of bias
13. Casas 2013 (Spain)	Prospective cohort	Children	Domestic products	Wheezing	Moderate
14. Chang 2009 (US)	Retrospective cohort	Children with asthma	Proximity to traffic	Asthma exacerbations	Low
15. Clarke 2015 (US)	Prospective cohort	Women	Pets	Thyroid cancer	Moderate
16. de Bilderling 2005 (United Kingdom)	Prospective cohort	Children & adolescents	Gas stove, Gas oven, Gas heating	Wheezing	High
17. Diez 2002 (Germany)	Nested case control	Infants at risk of allergies	Restoration work, Pets	Pulmonary infection, Wheeze	Moderate
18. Diez 2003 (Germany)	Prospective cohort	Children at risk of asthma	Redecoration,	Obstructive bronchitis, Wheeze	High
19. Du Prel 2006 (Germany)	Prospective cohort	Children	Damp, Heating	Bronchitis, Respiratory symptoms, Eczema	Low
20. Emenius 2003 (Sweden)	Nested case control	Children	Building age	Recurrent wheezing	Moderate
21. Emenius 2004 (Sweden)	Nested case control	Children	Redecoration, Damp	Recurrent wheezing	Moderate
22. Engvall 2001 (Sweden)	Retrospective cohort	Adults	Damp, Humidity, History of water leaks	Eye irritation, Nasal irritation, Throat irritation, Cough, facial skin symptoms, headache, Tiredness	High
23. Engvall 2010 (Sweden)	Retrospective cohort	Adults	Tenancy status	Eye irritation, Nasal irritation, Throat irritation, Cough	Moderate
24. Farrow 2003 (UK)	Prospective cohort	Women and children	Domestic products	Diarrhoea, Vomiting, Earache	Moderate
25. Franck 2014 (Germany)	Cohort	Mother baby dyads	Redecoration	Recurrent wheeze, Obstructive bronchitis	Low
26. Gan 2010 (Canada)	Prospective cohort	Adults	Proximity to traffic	CHD mortality	Low

Study (country)	Design	Population	Characteristic	Outcomes	Risk of bias
27. Garshick 2003 (United States)	Prospective cohort	Adults	Proximity to traffic	Wheeze, Cough, Phlegm	Moderate
28. Habre 2014 (United States)	Prospective cohort	Children with asthma	Particulate matter	Wheeze, Cough	Moderate
29. Hagerhed-Engman 2009 (Sweden)	Nested case control	Children	Damp / mould	Asthma, Eczema, Rhinitis	Low
30. Hagmolen of Ten Have 2007 (The Netherlands)	Prospective cohort	Children with asthma	Damp, Pets	Airway hyper-responsiveness	High
31. Hart 2014 (US)	Prospective cohort	Women	Proximity to traffic	Sudden cardiac death	Low
32. Harville 2018 (UK)	Prospective cohort	Women who had given birth	Mould	Low birth weight, preterm birth, small for gestational age	Moderate
33. Heinrich 2013 (Germany)	Prospective cohort	Women	Proximity to traffic	Mortality	Low
34. Henderson 2008 (UK)	Prospective cohort	Pregnant women	Domestic products	Wheeze	High
35. Herr 2012 (France)	Prospective cohort	Infants	Pets, Redecoration, House dust, Cleaning prays	Wheeze	Low
36. Hjortebjerg 2012 (Denmark)	Prospective cohort	Pregnant women	Redecoration	Congenital malformations	Low
37. Hoffmann 2007 (Germany)	Prospective cohort	Adults	Proximity to traffic	Coronary artery calcification	Low
38. Hunt 2011 (US)	Prospective cohort	Infants at risk of asthma	Particulate matter	Wheeze	Low
39. Ibargoyen-Roteta 2007 (Spain)	Prospective cohort	Children	Glazing, Damp / mould	Allergic Rhino-conjunctivitis	High
40. Jaakkola 2005 (Finland)	Prospective cohort	Children	Damp, Mould	Asthma	High

Study (country)	Design	Population	Characteristic	Outcomes	Risk of bias
41. Jaakkola 2010 (Finland)	Prospective cohort	Children	Damp / mould	Allergic rhinitis	High
42. Jedrychowski 2010 (Poland)	Prospective cohort	Children with intrauterine exposure	PAHs, Particulate matter	Wheeze	Moderate
43. Jedrychowski 2011 (Poland)	Prospective cohort	Infants	Damp / mould, Particulate matter	Eczema	Moderate
44. Jedrychowski 2014 (Poland)	Prospective cohort	Children with intrauterine exposure	PAHs	Wheeze	Moderate
45. Jung 2012 (US)	Prospective cohort	Children	Particulate matter	Wheeze	Moderate
46. Karvonen 2015 (Finland)	Prospective cohort	Children	Damp / mould	Asthma, cough, wheeze	Low
47. Kingsley 2015 (US)	Prospective cohort	Women	Proximity to traffic	Incident hypertension	Low
48. Koloski 2015 (Australia)	Prospective cohort	Adults	Pets	Irritable bowel syndrome, Functional dyspepsia	Low
49. Korppi 2008 (Finland)	Cohort	Children at risk of asthma	Pets,	Asthma	Moderate
50. Larsson 2009	Cohort	Children	Flooring, Damp	Autistic spectrum disorders	Moderate
51. Larsson 2010 (Sweden)	Cohort	Children	Flooring	Asthma	Low
52. Le Moual 2012 (France)	Prospective cohort	Women with asthma	Domestic products	Asthma	High
53. Li 2006 (US)	Prospective cohort	Children	Gas stove, Heating, Housing area	Lower respiratory tract symptoms	High
54. Li 2016 (US)	Prospective cohort	Adults	Proximity to traffic	Obesity	Low
55. Lindgren 2013 (Sweden)	Prospective cohort	Children	Proximity to traffic	Asthma, Bronchiolitis, Obstructive bronchitis	Low
56. Litonjua 2002 (US)	Prospective cohort	Children at risk of atopy	Pets	Wheeze	Moderate

Study (country)	Design	Population	Characteristic	Outcomes	Risk of bias
57. Lynch 2014 (US)	Prospective cohort	Children at risk of atopy	Pets, House dust	Wheeze	Moderate
58. Mahalingaiah 2014 (US)	Prospective cohort	Women	Proximity to traffic	Uterine leiomyomata	Low
59. Mahalingaiah 2016 (US)	Prospective cohort	Women	Proximity to traffic	Infertility	Low
60. McConnell 2002 (US)	Prospective cohort	Children	Gas stove, Pets	Asthma, wheeze	Low
61. McConnell 2006 (US)	Prospective cohort	Children	Proximity to traffic	Asthma, wheeze	Low
62. Mommers 2005 (Germany and the Netherlands)	Nested case control	Children	Gas stove, Heating, SES	Asthma symptoms, Cough	High
63. Morgernstern 2007 (Germany)	Prospective cohort	Children	Proximity to traffic	Wheeze, Cough, Bronchitis, Respiratory infections, Nasal symptoms	Moderate
64. Morgernstern 2008 (Germany)	Prospective cohort	Children	Proximity to traffic	Asthma, Hay fever, Eczema	Moderate
65. Nenna 2017 (Italy)	Case-control	Infants with bronchiolitis	Occupancy, Cooking oil	Bronchiolitis	High
66. Norback 2013 (Europe, Australia, US)	Prospective cohort	Adults	Damp / mould	Asthma, Bronchial hyper-responsiveness	High
67. Ostro 1993 (US)	Prospective cohort	Adults	Gas stove	Respiratory illness	Low
68. Pettigrew 2004 (US)	Prospective cohort	Infants at risk of asthma	Mould	Otitis media	Moderate
69. Pettigrew 2004 b (US)	Prospective cohort	Infants	Heating, Mould, Pets, Air conditioning	Otitis media	Low
70. Pindus 2016 (Estonia)	Prospective cohort	Not specified	Particulate matter	Cough, Wheeze, Asthma, Allergic	Moderate

Study (country)	Design	Population	Characteristic	Outcomes	Risk of bias
				rhinitis, Breathlessness, Chest tightness, Cardiac disease, Stroke, Hypertension, Heart infarction or angina pectoris	
71. Ponsonby 2001 (Australia)	Prospective cohort	Children	Gas appliances, House dust	Asthma	Moderate
72. Power 2015 (US)	Prospective cohort	Women	Proximity to traffic	Anxiety	Low
73. Puett 2014 (US)	Prospective cohort	Women	Proximity to traffic	Lung cancer	Low
74. Pujades-Rodriguez 2009 (UK)	Prospective cohort	Adults	Proximity to traffic	Wheeze, COPD, Bronchial hyper-responsiveness, Allergic sensitisation	Moderate
75. Reponen 2011 (US)	Prospective cohort	Children	Mould, Air conditioning, House dust	Asthma	Low
76. Rice 2015 (US)	Prospective cohort	Adults	Proximity to traffic	Asthma, Obstruction, Wheeze, Cough	Moderate
77. Roda 2011 (France)	Prospective cohort	Infants	Formaldehyde, Pets,	Lower respiratory infection, Lower respiratory infection with wheeze	Moderate
78. Samet 1993 (US	Prospective cohort	Infants	Gas stove	Respiratory illness, Cough, Wheeze	Low
79. Sbihi 2016 (Canada)	Prospective cohort	Children	Proximity to traffic	Asthma	Low
80. Sherriff 2005 (UK)	Prospective cohort	Pregnant women	Domestic products	Wheeze	High
81. Shmuel 2017 (US and Puerto Rico)	Prospective cohort	Adults	Proximity to traffic	Breast cancer	Moderate
82. Shu 2013 (Sweden)	Prospective cohort	Children	Flooring	Asthma	Moderate

Study (country)	Design	Population	Characteristic	Outcomes	Risk of bias
83. Sorensen 2010 (Denmark)	Prospective cohort	Pregnant women	Redecoration	Preterm birth, small for gestational age	Low
84. Stark 2005 (US)	Prospective cohort	Children at risk of asthma or allergy	Mould	Allergic rhinitis	Low
85. Thacher 2017 (Sweden)	Prospective cohort	Children	Damp, Mould	Asthma, Rhinitis	Low
86. Tiesler 2015 (Germany)	Prospective cohort	Children	Damp / mould	Sleep problems	High
87. Tin Tin 2016	Prospective cohort	Pregnant women,	Occupancy, Tenancy status, Heating, Mould	Acute respiratory infections	Moderate
88. Triche 2002 US)	Prospective cohort	Infants	Heating	Wheeze, Cough	Low
89. Triche 2005 (US)	Prospective cohort	Women with an infant child	Gas heating	Wheeze, Chest tightness	Moderate
90. Virtanen 2014 (Finland)	Prospective cohort	Children	Pets	Type 1 diabetes	Moderate
91. Weinmann 2017 (Germany)	Prospective cohort	Adults	Domestic products	Asthma, Wheeze	High
92. Weinmayr 2015 (Germany)	Prospective cohort	Adults	Proximity to traffic	Type 2 diabetes	Low
93. Wesselink 2017 (US)	Retrospective cohort	Pregnant women	Proximity to traffic	Pre-eclampsia, Placental abruption, Small for gestational age, Stillbirth	Moderate
94. White 2017 (US and Puerto Rico)	Prospective cohort	Women at risk of breast cancer	Heating, Cooking	Breast cancer	Low
95. Willers 2006 (the Netherlands)	Prospective cohort	Children at risk of asthma	Gas stove	Asthma, Wheeze, Nasal symptoms, Eczema	Moderate
96. Zhang 2016 (US)	Prospective cohort	Women	Proximity to traffic	Hypertension	Low

Study (country)	Design	Population	Characteristic	Outcomes	Risk of bias
97. Zhou 2013 (France)	Prospective cohort	Mother-child pairs,	Pets, Proximity to traffic, Heating, Damp	Asthma, Wheeze, Bronchiolitis	Moderate
98. Zock 2007 (10 European Countries)	Prospective cohort	Adults	Domestic products	Asthma, Wheeze. Nocturnal shortness of breath	High

See Appendix D:for full evidence tables.

Quality assessment of public health studies included in the evidence review

See appendix F for full GRADE tables.

Economic evidence

No economic evidence review was carried out for this review

Economic model

No economic modelling was carried out for this review

Evidence statements

Sources of NO_2

Gas heating (Grade F.1.1.1)

- This evidence review found low quality evidence from 1 study of 2,898 infants at risk of allergy that that gas heating was not associated with cough aOR 0.78 (95%CI 0.56 to 1.09) and infants not at risk of allergy aOR 1.01 (95%CI 0.69 to 1.46)
- This evidence review found low quality evidence from 1 study of 1,868 children showing that gas central heating was not associated with wheeze aOR 0.76 (95%CI 0.47 to 1.23)
- This evidence review found low quality evidence from 1 study of 1,868 children showing that use of a gas fire was not associated with wheeze aOR 0.97 (95%CI 0.67 to 1.39)
- This evidence review found high quality evidence for gas as heating fuel from 1 study with 50,884 women at risk of breast cancer showing that gas heating was associated with breast cancer aHR 1.15 (95%CI 1.00 to 1.32)
- No evidence was identified for the following subgroups of interest
    - People living in deprived areas
    - Older people
    - People with disabilities
    - Pregnant women
    - People with conditions associated with or exacerbated by indoor air pollution

Gas space heater (Grade F.1.1.2)

- This evidence review found high quality evidence from 1 study with 890 infants showing that the use of a gas space heater was associated with wheeze aRR 1.25 (95%CI 1.05 to 1.50)
- This evidence review found moderate quality evidence from 1 study with 888 mothers of infants showing that use of a gas space heater was not associated with

  - cough aRR 1.00 (95%CI 0.97 to 1.04),
  - wheeze aRR 1.03 (95%CI 0.94 to 1.13),
  - phlegm aRR 0.96 (95%CI 0.88 to 1.05),
  - runny / stuffy nose aRR 0.99 (95%CI 0.95 to 1.03),
  - sore throat aRR 0.99 (95%CI 0.95 to 1.04)
  - laryngitis aRR 0.93 (95%CI 0.79 to 1.10).
- This evidence review found high quality evidence from 1 study with 890 infants showing that the use of a gas space heater was not associated with cough aRR 0.94 (95%CI 0.75 to 1.18)
- This evidence review found moderate quality evidence from 1 study with 3,535 children with no history of asthma showing that use of a gas space heater was not associated with asthma with wheeze aOR 1.20 (95%CI 0.70, 2.00)
- This evidence review found moderate quality evidence from 1 study of 888 mothers of infants showing that use of a gas space heater was not associated with chest tightness aRR 1.01 (95%CI 0.96 to 1.07)
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women
  - People with conditions associated with or exacerbated by indoor air pollution.

Gas for cooking (Grade F.1.1.3)

- This evidence review found high quality evidence from 1 study with 321 adults showing that the use of a gas stove was associated with lower respiratory tract infections aOR 1.23 1.03 to 1.47) but not with upper respiratory tract infections aOR 1.06 (95%CI 0.94 to 1.18)
- This evidence review found moderate quality evidence from 1 study of 728 children with asthma in multi-family housing showing that the use of a gas stove was associated with
  - shortness of breath aOR 2.38 (95%CI 1.12 to 5.06) and
  - chest tightness aOR 4.34 (95%CI 1.76 to 10.69)
- This evidence review found moderate quality evidence from 1 study with 3,148 children at risk of atopy showing that the use of a gas stove was associated with nasal symptoms aOR 1.34 (95%CI 1.06 to 1.71)
- This evidence review found low quality evidence from 1 study with 849 children showing that use of a gas stove was associated with cough aOR 1.52 (95%CI 1.06 to 2.18) but not with wheeze aOR 1.28 (95%CI 0.88 to 1.86) for those children whose mother did not have asthma or for wheeze or cough for children whose mother had asthma aOR 1.03 (95%CI 0.59 to 1.79) and aOR 0.79 (95%CI 0.46 to 1.36) respectively
- This evidence review found high quality evidence from 1 study with 1,205 infants showing that use of a gas stove or gas for cooking was not associated with
  - respiratory illness aOR 0.98 (95%CI 0.90 to 1.07),
  - wheeze aOR 0.84 (95%CI 0.64 to 1.09)
  - cough aOR 0.94 (95%CI 0.82 to 1.07)

- This evidence review found moderate quality evidence from 1 study with 5078 children showing that the use of gas for cooking was not associated with wheeze aOR 1.09 (95%CI 0.76 to 1.57)
- This evidence review found moderate quality evidence from 1 study with 1868 children and adolescents showing that any use of gas for cooking was not associated with wheeze aOR 1.02 (95%CI 0.77 to 1.36)
- This evidence review found low quality evidence from 1 study of 728 children with asthma in single-family housing showing that use of a gas stove or gas for cooking was not associated with
  - shortness of breath aOR 0.91 (95%CI 0.50 to 1.64)
  - chest tightness aOR 0.68 (95%CI 0.34 to 1.32)
- This evidence review found moderate quality evidence from 2 studies that use of a gas stove or gas for cooking was not associated with asthma aOR 1.3 (95%CI 0.80 to 2.00) for 1 study with 3535 children and aOR 1.33 (95%CI 0.88 to 2.00) for the second study with 5078 children.
- This evidence review found low quality evidence from 1 study with 3,148 children at risk of atopy showing that use of a gas stove or gas for cooking was not associated with eczema aOR 0.97 (95%CI 0.74 to 1.26)
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women

Other gas appliance (F.1.1.4)

- This evidence review found very low quality evidence from 1 study with 1,191 children showing that the use of an unvented gas geyser for water heating was not associated with cough aOR 1.74 (95%CI 0.74 to 4.12)
- This evidence review found very low quality evidence from 1 study with 1,191 children showing that the use of a vented gas geyser for water heating was not associated with wheeze aOR 1.28 (95%CI 0.85 to 1.94)
- This evidence review found low quality evidence from 1 study with 728 children in multi-family housing showing that the use of a gas dryer was not associated with
  - shortness of breath aOR 2.39 (95%CI 0.77 to 7.43)
  - chest tightness aOR 1.09 (95%CI 0.31 to 3.90)
- This evidence review found low quality evidence from 1 study with 728 children in single-family housing showing that the use of a gas dryer was not associated with
  - shortness of breath aOR 0.91 (95%CI 0.50 to 1.64)
  - chest tightness aOR 1.41 (95%CI 0.61 to 3.26)
- This evidence review found low quality evidence from 1 study with 456 children showing that the use of home gas appliances (appliances were not specified) was not associated with asthma aOR 1.30 (95%CI 0.74 to 2.29)
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas

- Older people
- People with disabilities
- Pregnant women
- People with conditions associated with or exacerbated by indoor air pollution

Sources of particulate matter

Fireplace (Grade F.1.2.1)

- This evidence review found high quality evidence from 1 study of 888 mothers of infants showing that the use of a fireplace for heating was associated with
  - cough aOR 1.05 (95%CI 1.01 to 1.09)
  - sore throat aOR 1.04 (95%CI 1.00 to 1.08)
- This evidence review found moderate quality evidence from 1 study of 890 infants showing that the use of a fireplace was not associated with
  - cough aOR 0.99 (95%CI 0.81 to 1.21)
  - wheeze aOR 0.25 (95%CI 0.04 to 1.43),
- This evidence review found low quality evidence from 1 study of 905 adults showing that the use of wood as heating fuel was not associated with
  - wheeze without cold aOR 1.14 (95%CI 0.75 to 1.73)
  - hay fever (reported as allergic rhinitis) aOR 0.63 (95%CI 0.42 to 0.94)
  - breathlessness aOR 0.97 (95%CI 0.64 to 1.48),
  - chest tightness aOR 1.05 (95%CI 0.72 to 1.51),
  - cardiac disease aOR 0.92 (95%CI 0.60 to 1.39)
  - hypertension aOR 0.78 (95%CI 0.54 to 1.12),
  - stroke aOR 0.85 (95%CI 0.27 to 2.71),
  - heart infarction or angina pectoris aOR 0.67 (95%CI 0.28 to 1.56)
- This evidence review found high quality evidence from 1 study of 50884 women at risk of breast cancer showing that the use of a fireplace for heating was associated with breast cancer aHR 1.11 (95%CI 1.01 to 1.22)
- This evidence review found moderate quality evidence from 1 study of 50884 women at risk of breast cancer showing that the use of wood as heating fuel was not associated with breast cancer aHR 1.09 (95%CI 0.98 to 1.21)
- This evidence review found moderate quality evidence from 1 study of 50884 women at risk of breast cancer showing that the use of wood as the main source of heating fuel was not associated with breast cancer aHR 1.09 (95%CI 0.82 to 1.45)
- This evidence review found moderate quality evidence from 1 study with 813 infants showing that the use of a fireplace was not associated with
  - any episodes of earache aOR 1.14 (95%CI 0.90 to 1.45)
  - recurrent earache (four or more episodes separated by 21 days in 1 year) aOR 0.99 (95%CI 0.58 to 1.72)
- This evidence review found moderate quality evidence from 1 study of 888 mothers of infants showing that the use of a fireplace was not associated with
  - wheeze aOR 1.07 (95%CI 0.97 to 1.18),

  - laryngitis aOR 1.02 (95%CI 0.94 to 1.10),
  - phlegm aOR 1.04 (95%CI 0.99 to 1.09)
  - runny / stuffy nose aOR 0.99 (95%CI 0.95 to 1.04)
  - chest tightness aOR 1.05 (95%CI 0.99 to 1.12)
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women
  - People with conditions associated with or exacerbated by indoor air pollution

Wood stove (Grade F.1.2.2)

- This evidence found moderate quality evidence from 1 study with 813 infants showing that the use of wood stoves was not associated with
  - any episodes of earache aOR 1.22 (95%CI 0.66 to 2.23)
  - recurrent earache (four or more episodes separated by 21 days in 1 year) aOR 1.08 (95%CI 0.85 to 1.38)
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women
  - People with conditions associated with or exacerbated by indoor air pollution

Heating or cooking fuel (Grade F.1.2.3)

- This evidence review found high quality evidence from 1 study with 28,888 children showing that the use of coal, wood, gas or oil as heating fuel was associated with
  - bronchitis (ever diagnosed) aOR 1.15 (95%CI 1.00 to 1.32) for homes in West Germany
  - more than 4 colds in past 12 months aOR 1.13 (95%CI 1.03 to 1.23) for homes in East Germany
- This evidence review found moderate quality evidence from the same study found the use of coal, wood, gas or oil as heating fuel was not associated with
  - frequent cough aOR 0.97 (95%CI 0.86 to 1.10) for homes in East Germany
  - frequent cough aOR 0.88 (95%CI 0.68 to 1.15) in homes in West Germany,
  - sneeze attacks in past 12 months aOR 0.92 (95%CI 0.80 to 1.06) for homes in East Germany and
  - sneeze attacks in past 12 months aOR 1.21 (95%CI 0.88 to 1.66) for homes in West Germany,
  - bronchitis (ever diagnosed) aOR 1.02 (95%CI 0.96 to 1.09) for homes in East Germany
  - more than 4 colds in past 12 months aOR 0.96 (95%CI 0.79 to 1.18) for homes in West Germany.
  - Allergy (ever diagnosed) aOR 1.07 (95%CI 0.96 to 1.18) for homes in East Germany

- Allergy (ever diagnosed) aOR 0.97 (95%CI 0.79 to 1.19) in West Germany
- Eczema (ever diagnosed) aOR 0.90 (95%CI 0.83 to 0.98) for homes in East Germany
- Eczema (ever diagnosed) aOR 1.07 (95%CI 0.87 to 1.32) in West Germany
- Overweight aOR 0.89 (95%CI 0.78 to 1.01) for homes in East Germany
- Overweight aOR 1.12 (95%CI 0.86 to 1.47) in West Germany

- This evidence review found moderate quality evidence for wood as heating fuel from 1 study with 50,884 women at risk of breast cancer showing that wood was not associated with breast cancer aHR 1.09 (95%CI 0.98 to 1.32)
  -
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women
  - People with conditions associated with or exacerbated by indoor air pollution

Coal heating (Grade F.1.2.4)

- This evidence review found high quality evidence from 1 study of 452 children showing that the use of coal for heating was associated with lower respiratory tract infections -aOR 1.45 (95%CI 1.07 to 1.97).
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women
  - People with conditions associated with or exacerbated by indoor air pollution

Artificial logs (Grade F.1.2.5)

- This evidence review found moderate quality evidence from 1 study with 50,884 women at risk of breast cancer that the use of artificial logs for heating was not associated with breast cancer aHR 0.98 (95%CI 0.85 to 1.12)
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women
  - Children and young people
  - People with conditions associated with or exacerbated by indoor air pollution

Fuel oil (Grade F.1.2.6)

- This evidence review found moderate quality evidence from 1 study with 50,884 women at risk of breast cancer that the use of fuel oil for heating was not associated with breast cancer aHR 1.13 (95%CI 0.97 to 1.32)

- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women
  - People with conditions associated with or exacerbated by indoor air pollution

Cooking oil (Grade F.1.2.7)

- This evidence review found very low quality evidence from 1 study with 416 infants showing that the use of seed oil for cooking was associated with bronchiolitis aOR 1.82 (95%CI 1.21 to 2.74)
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women
  - People with conditions associated with or exacerbated by indoor air pollution

Paraffin (Kerosene) heating (Grade F.1.2.8)

- This evidence review found high quality evidence from 1 study with 888 mothers of infants that the use of a paraffin heater was associated with wheeze aOR 1.06 (95%CI 1.01 to 1.11)
- This evidence review found moderate quality evidence from 1 study with 888 mothers of infants showing that the use of a paraffin heater was not associated with
  - cough aOR 1.01 (95%CI 0.99 to 1.03),
  - laryngitis aOR 1.01 (95%CI 0.97 to 1.04),
  - phlegm aOR 0.98 (95%CI 0.93 to 1.03),
  - runny / stuffy nose aOR 1.01 (95%CI 0.99 to 1.03)
  - sore throat aOR 1.00 (95%CI 0.97 to 1.02)
  - chest tightness aOR 1.02 (95%CI 0.99 to 1.05)
- This evidence review found moderate quality evidence from 1 study with 890 infants showing that the use of a paraffin heater was not associated with
  - cough aOR 1.01 (95%CI.93 to 1.10),
  - wheeze aOR 0.90 (95%CI 0.64 to 1.25)
- This evidence review found very low quality evidence from 1 study with 1,137 children showing that the use of paraffin heaters was not associated with lower respiratory tract infections aOR 1.41 (95%CI 0.96 to 2.07)
- This evidence review found moderate quality evidence from 1 study with 813 infants showing that the use of a paraffin heater was not associated with
  - any episodes of earache aOR 0.94 (95%CI 0.50 to 1.70)
  - recurrent earache (4 or more episodes separated by 21 days in 1 year) aOR 0.91 (95%CI 0.67 to 1.26)
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas

- Older people
- People with disabilities
- Pregnant women
- People with conditions associated with or exacerbated by indoor air pollution

Sources of allergens

Pets (Grade F.1.3.1)

- This evidence review found low quality evidence from 1 study with 5,078 children showing that having pets at home was not associated with wheeze aOR 1.05 (95%CI 0.83 to 1.33)
- This evidence review found high quality evidence from 1 study with 1,879 infants showing that having a cat at home was protective against with wheeze aOR 0.65 (95%CI 0.47 to 0.89)
- This evidence review found moderate quality evidence from 1 study with 1,765 infants showing that prenatal and postnatal exposure to cats was not associated with
    - wheeze aOR 0.94 (95%CI 0.61 to 1.46)
    - bronchiolitis aOR 0.69 (95%CI 0.47 to 1.03)
- This evidence review found moderate quality evidence from 1 study with 226 children at risk of atopy showing that dogs at home was protective against wheeze aOR 0.12 (95%CI 0.01 to 0.97)
- This evidence review found very low quality evidence from 1 study with 1,562 children showing exposure to pets was associated with cough
    - aOR 1.58 (95%CI 1.10 to 2.20) for previous short period of exposure to pets,
    - aOR 1.64 (95%CI 1.09 to 2.46) for constant exposure to pets
- This evidence review found very low quality evidence from 1 study with 1,562 children showing previous long period of exposure to pets was not associated with cough aOR 1.10 (95%CI 0.72 to 1.68)
- This evidence review found very low quality evidence from 1 study with 526 children with asthma showing that pet ownership was not associated with airway hyper-responsiveness aOR 1.17 (95%CI 0.70 to 1.94)
- This evidence review found moderate quality evidence from 1 study with 3,535 children showing that for pet ownership in childhood was associated with asthma aOR 1.60 (95%CI 1.00 to 2.50)
- This evidence review found high quality evidence from 1 study with 1,765 infants showing that prenatal and postnatal exposure to cats was protective against asthma aOR 0.27 (95%CI 0.08 to 0.86)
- This evidence review found moderate quality evidence from 1 study with 5,078 children showing that pet ownership was protective against asthma aOR 0.69 (95%CI 0.52 to 0.91)
- This evidence review found low quality evidence from 1 study with 100 children with wheeze aOR showing that exposure to cats was not associated with asthma aOR 0.26 (95%CI 0.03 to 2.42) and exposure to dogs aOR 0.20 (95%CI 0.02 to 1.78)
- This evidence review found moderate quality evidence from 1 study with 3,535 children with wheeze showing exposure to pets was not associated with asthma aOR 1.10 (95%CI 0.60 to 2.00)

- This evidence review found high quality evidence from 1 study with 767 adults showing that having pets at home was associated with irritable bowel syndrome aOR 2.09 (95%CI 1.19 to 3.67) for exposure to an herbivore pet
- This evidence review found moderate quality evidence from 1 study with 767 adults showing that having pets at home was not associated with irritable bowel syndrome
  - aOR 1.47 (95%CI 0.83 to 2.61) for any pet,
  - aOR 1.58 (95%CI 0.90 to 2.76) for a carnivore pet,
  - aOR 0.97 (95%CI 0.26 to 3.59) for an omnivore pet
- This evidence review found high quality evidence from 1 study with 767 adults showing that having pets at home was associated with functional dyspepsia
  - aOR 2.34 (95%CI 1.24 to 4.45) for exposure to an herbivore pet
  - aOR 2.04 (95%CI 1.03 to 4.03) for exposure to an carnivore pet
- This evidence review found moderate quality evidence from 1 study with 767 adults showing that having pets at home was not associated with functional dyspepsia
  - aOR 1.69 (95%CI 0.86 to 3.36) for any pet
  - aOR 0.98 (95%CI 0.21 to 4.50) for an omnivore pet
- This evidence review found low quality evidence from 1 study with 61,799 women that pet ownership in childhood was not associated with papillary thyroid cancer aRR 0.77 (95%CI 0.51 to 1.17)
- This evidence review found moderate quality evidence from 1 study with 813 infants showing that having pets at home was not associated with
  - any episodes of otitis media aOR 0.76 (95%CI 0.47 to 1.26)
  - recurrent otitis media (four or more episodes separated by 21 days in 1 year) aOR 1.06 (95%CI 0.90 to 1.26)
- This evidence review found low quality evidence from 1 study with 3,143 children showing that having pets at home was not associated with type 1 diabetes (clinical or pre-clinical)
  - aOR for a dog at home aOR 0.40 (95%CI 0.14 to 1.14)
  - aOR for a cat at home aOR 1.34 (95%CI 0.58 to 3.10)
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women

Carpet flooring (Grade F.1.3.2)

- This evidence review found high quality evidence from 1 study with 465 infants showing that having carpet flooring at home during pregnancy was associated with
  - wheeze aOR 5.39 (95%CI 1.75 to 16.54)
  - obstructive bronchitis aOR 4.39 (95%CI 1.01 to 19.05)
- This evidence review found moderate quality evidence from 1 study with 465 infants showing that having carpet flooring at home in the first year of life was not associated with wheeze aOR 4.18 (95%CI 0.40 to 43.70)

- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - People with conditions associated with or exacerbated by indoor air pollution

Second hand mattress (Grade F.1.3.3)

- This evidence review found moderate quality evidence from 1 study with 2,898 infants showing that having a used (second-hand) mattress was associated with cough aOR 1.47 (95%CI 1.00 to 2.17) in the infants at risk of allergies
- This evidence review found low quality evidence from 1 study with 2,898 infants showing having a used (second-hand) mattress was not associated with cough for infants not at risk of allergies aOR 1.22 (95%CI 0.80 to 1.88)
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women
  - People with conditions associated with or exacerbated by indoor air pollution

Sources of damp or mould

High air humidity in bathroom (Grade F.1.4.1)

- This evidence review found low quality evidence from 1 study with 9,808 adults showing that high bathroom air humidity was associated with both
  - cough aOR 2.30 (95%CI 2.21 to 2.40)
  - nasal symptoms aOR 1.94 (95%CI 1.88 to 2.01)
  - throat symptoms aOR 3.23 (95%CI 3.12 to 3.25)
  - facial skin symptoms aOR 2.42 (95%CI 2.33 to 2.51)
  - headache aOR 3.07 (95%CI 2.96 to 3.17)
  - tiredness aOR 2.16 (95%CI 2.11 to 2.22)
  - eye irritation aOR 2.94 (95%CI 2.83 to 3.05)
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women
  - Children and young people
  - People with conditions associated with or exacerbated by indoor air pollution

Condensation on windows (Grade F.1.4.2)

- This evidence review found low quality evidence from 1 study with 9,808 adults showing that condensation on windows was associated with both
  - Cough aOR 2.58 (95%CI 2.47 to 2.70)
  - Nasal symptoms aOR 2.72 (95%CI 2.62 to 2.81)
  - Throat symptoms aOR 3.22 (95%CI 3.19 to 3.35)
  - facial skin symptoms aOR 2.11 (95%CI 2.02 to 2.20)
  - headache aOR 3.30 (95%CI 3.19 to 3.43)
  - tiredness aOR 2.19 (95%CI 2.12 to 2.25)
  - eye irritation aOR 3.14 (95%CI 3.01 to 3.27)
- This evidence review found high quality evidence from 1 study with 4,779 children showing that more than 5 cm condensation on windows was associated with autism spectrum disorders
  - aOR 2.05 (95%CI 1.03 to 4.10) for condensation in the child's room
  - aOR 2.03 (95%CI 1.08 to 3.82) for condensation in the parent's room
- This evidence review found moderate quality evidence from 1 study with 4,779 children showing that between 1 cm and 5cm condensation on windows was not associated with autism spectrum disorders
  - aOR 1.35 (95%CI 0.71 to 2.57) for condensation on windows in the child's room
  - aOR 1.52 (95%CI 0.84 to 2.73) for condensation on windows in the parent's room
- This evidence review found low quality evidence from 1 study with 6,853 children showing that heavy condensation on windows was not associated with acute respiratory infection requiring hospitalisation
  - aHR 1.01 (95%CI 0.86 to 1.17) for condensation on windows rarely
  - aHR 1.05 (95%CI 0.88 to 1.27) for condensation on windows quite often
  - aHR 1.00 (95%CI 0.77 to 1.31) for heavy condensation on windows quite often
- This evidence review found very low quality evidence from 1 study with 7,104 adults showing that condensation on windows was not associated with
  - asthma aRR 1.07 (95%CI 0.75 to 1.53)
  - asthma and airway hyper-responsiveness aRR 1.43 (95%CI 0.67 to 3.07)
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women
  - People with conditions associated with or exacerbated by indoor air pollution

Moisture on walls/surfaces (Grade F.1.4.3)

- This evidence review found very low quality evidence from 1 study with 1,916 children showing that moisture on walls was not associated with asthma aOR 0.92 (95%CI 0.54 to 1.54)

- This evidence review found low quality evidence from 1 study with 3,360 children showing that moisture on walls was associated with allergic rhino-conjunctivitis aOR 1.90 (95%CI 1.01 to 3.56)

- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women
  - People with conditions associated with or exacerbated by indoor air pollution

History of water leakage (Grade F.1.4.4)

- This evidence review found low quality evidence from 1 study with 9,808 adults that a history of water leakage was associated with
  - cough aOR 1.52 (95%CI 1.44 to 1.59)
  - nasal symptoms aOR 1.36 (95%CI 1.31 to 1.41)
  - throat symptoms aOR 2.18 (95%CI 2.09 to 2.28)
  - facial skin symptoms aOR 1.56 (95%CI 1.48 to 1.63)
  - headache aOR 1.27 (95%CI 1.21 to 1.33)
  - tiredness aOR 2.19 (95%CI 2.12 to 2.25)
  - irritation aOR 1.57 (95%CI 1.50 to 1.65)
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women
  - Children and young people
  - People with conditions associated with or exacerbated by indoor air pollution

Water damage (Grade F.1.4.5)

- This evidence review found low quality evidence from 1 study with 1,863 children showing that water damage was associated with hay fever (reported as allergic rhinitis) aOR 2.06 (95%CI 1.35 to 3.13)
- The evidence review found very low quality evidence from 1 study with 1916 children showing that water damage was not associated with asthma aOR 1.01 (95%CI 0.45 to 2.26)
- The evidence review found moderate quality evidence from 1 study with 499 infants showing that water damage was not associated with lower respiratory illness aOR 1.34 (95%CI 0.99 to 1.82) for infants at risk of asthma or allergy.
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas

- Older people
- People with disabilities
- Pregnant women
- People with conditions associated with or exacerbated by indoor air pollution

Damp condition (Grade F.1.4.6)

- This evidence review found high quality evidence from 1 study with 26,888 children showing that damp conditions were associated with
  - bronchitis (ever diagnosed) aOR 1.25 (95%CI 1.13 to 1.37) for homes in East Germany
  - bronchitis (ever diagnosed aOR 1.30 (95 % 1.03 to 1.65) for homes in West Germany,
  - frequent colds (more than 4 colds in last 12 months) aOR 1.41 (95%CI 1.25 to 1.60) for homes in East Germany
  - frequent colds (more than 4 colds in last 12 months) aOR 1.62 95 % 1.21 to 2.17) for homes in West Germany,
  - frequent cough aOR 1.66 (95%CI 1.42 to 1.95) for homes in East Germany
  - frequent cough aOR 2.60 (95%CI 1.90 to 3.55) for homes in West Germany
  - sneeze attacks in the last 12 months aOR 1.52 (95%CI 1.26 to 1.83) for homes in East Germany
  - sneeze attacks in the last 12 months aOR 2.25 (95%CI 1.52 to 3.33) for homes in West Germany
  - eczema aOR = 1.15 (95%CI 1.01 to 1.31) for homes in East Germany
- This evidence review found moderate quality evidence from 1 study with 26888 children showing that damp conditions were not associated with
  - allergies (ever diagnosed) aOR 1.09 (95%CI 0.93 to 1.66) for homes in East Germany
  - allergies (ever diagnosed) aOR 1.20 (95%CI 0.87 to 1.66) for homes in West Germany
  - eczema (ever diagnosed) aOR 1.10 (95%CI 0.77 to 1.57) for homes in West Germany
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women
  - People with conditions associated with or exacerbated by indoor air pollution

Sources of VOCs

Parquet flooring (Grade F.1.5.1)

- This evidence review found moderate quality evidence from 1 study with 465 infants showing that exposure to parquet flooring during pregnancy was not associated with wheeze aOR 5.78 (95%CI 0.30 to 111.08)
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - People with conditions associated with or exacerbated by indoor air pollution

Laminate flooring (Grade F.1.5.2)

- This evidence review found high quality evidence from 1 study with 465 infants showing that exposure to laminate flooring during pregnancy was associated with wheeze aOR 4.46 (95%CI 1.01 to 19.63)
- This evidence review found moderate quality evidence from 1 study with 465 infants showing that exposure to laminate flooring in in the first year of life was not associated with wheeze aOR 2.44 (95%CI 0.40 to 14.74)
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - People with conditions associated with or exacerbated by indoor air pollution

PVC flooring (Grade F.1.5.3)

- This evidence review found high quality evidence from 1 study with 465 infants showing that exposure to PVC flooring during pregnancy was associated with wheeze aOR 24.7 (95%CI 2.18 to 280.39)
- This evidence review found high quality evidence from 1 study with 465 infants showing that exposure to PVC flooring in the first year of life was associated with wheeze aOR 51.7 (95%CI 3.21 to 833.2)
- This evidence review found moderate quality evidence from 1 study with 4,779 children showing that exposure to PVC flooring in childhood was not associated with autism spectrum disorders at 6 to 8 years of age
  - aOR 1.19 (95%CI 0.71 to 2.00) for PVC flooring in the child's bedroom
  - aOR 1.59 (95%CI 0.97 to 2.61) for PVC flooring in the parent's bedroom
- This evidence review found moderate quality evidence from 1 study with 3,228 children showing that exposure to PVC flooring in childhood was associated with asthma at 5 years of age
  - aOR 1.54 (95%CI 1.06 to 2.23) for PVC flooring in the child's bedroom when compared with wood flooring,
  - aOR 1.60 (95%CI 1.29 to 2.81) for PVC flooring in the parent's bedroom compared to wood flooring
  - aOR 1.71 (95%CI 1.05 to 2.80) for PVC flooring in the parent's bedroom when compared with other types of flooring
- This evidence review found moderate quality evidence from 1 study with 3,228 children showing that exposure to PVC flooring in childhood was associated with asthma at 10 years of age
  - aOR 1.54 (95%CI 1.06 to 2.23) for PVC flooring in the child's bedroom when compared with other types of flooring,
  - aOR 2.04 (95%CI 1.41 to 2.94) for PVC flooring in the parent's bedroom when compared with other types of flooring and
  - aOR 1.90 (95%CI 1.29 to 2.81) for PVC flooring in the parent's bedroom when compared with wood flooring

- This evidence review found low quality evidence from 1 study with 3,228 children showing that exposure to PVC flooring in child's room was not associated with
  - asthma at 5 years of age aOR 1.50 (95%CI 0.91 to 2.47) when compared to other flooring
  - asthma at 10 years of age aOR 1.37 (95%CI 0.92 to 2.04) when compared to wood flooring
- This evidence review found moderate quality evidence from 1 study with 2,779 children showing that
  - PVC flooring in the child's bedroom was not associated with asthma in the following 5 years aOR 1.52 (95%CI 0.99 to 2.35)
  - PVC flooring in the parent's bedroom was not associated with asthma in the following 5 years aOR 1.48 (95%CI 0.86 to 2.57)
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - People with conditions associated with or exacerbated by indoor air pollution

New furniture (Grade F.1.5.4)

- This evidence review found moderate quality evidence from 1 study with 465 infants showing that new furniture during pregnancy or in the first year of life was not associated with recurrent wheeze
  - aOR 1.94 (95%CI 0.72 to 5.26) for new furniture during pregnancy
  - aOR 2.26 95%CI 0.83 to 6.17) for new furniture in the first year of life.
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - People with conditions associated with or exacerbated by indoor air pollution

Home products - Air fresheners (Grade F.1.5.5)

- This evidence review found very low quality evidence from 1 study with 3,503 adults that the use of air fresheners was not associated with asthma
  - aRR 1.29 (95%CI 0.74 to 2.26) for the use of any perfumed or scented product
  - aRR 1.46 (95%CI 0.78 to 2.70) for the use of air refreshing sprays
- This evidence review found moderate quality evidence from 1 study with 14,541 women showing that the use of air fresheners most days during pregnancy was associated with headache
  - aOR 1.24 (95%CI 1.11 to 1.38) at 8 months after giving birth
  - aOR 1.22 (95%CI 1.09 to 1.36) at between 9 to 21 months after giving birth
- This evidence review found moderate quality evidence from 1 study with 14,541 women showing that the use of air fresheners once a week during pregnancy was associated with headache

- aOR 1.29 (95%CI 1.14 to 1.47) at between 9 to 21 months after giving birth

- This evidence review found that the use of air fresheners once a week during pregnancy was not associated with headache in mothers 8 months after birth - low quality evidence from 1 study with 14,541 women aOR 1.06 (95%CI 0.94 to 1.19)
- This evidence review found that the use of air fresheners most days during pregnancy was associated with depression at 8 months after giving birth - moderate quality evidence from 1 study with 14,541 women aOR 1.19 (95%CI 1.05 to 1.36)
- This evidence review found that the use of air fresheners once a week during pregnancy was not associated with depression in mothers 8 months after the birth - low quality evidence from 1 study with 14,541 women aOR 1.11 (95%CI 0.96 to 1.29)
- This evidence review found low quality evidence from 1 study with 14,541 women showing that the use of air fresheners during pregnancy was not associated with
    - cough or cold 9 to 21 months after the birth aOR 1.03 (95%CI 0.87 to 1.20) for use of air fresheners once a week during pregnancy
- This evidence review found low quality evidence from 1 study with 14,541 women showing that the use of air fresheners during pregnancy was associated with a reduction in cough or cold 9 to 21 months after the birth aOR 0.82 (95%CI 0.72 to 0.93) for air freshener use most days during pregnancy
- This evidence review found low quality evidence from 1 study with 2,292 mothers of infants showing that the use of air fresheners was not associated with
    - Wheeze aOR 1.09 (95%CI 0.87 to 1.37) for air freshener use,
    - Wheeze aOR 1.39 (95%CI 0.85 to 2.29) for the use of air fresheners during pregnancy only
    - Wheeze aOR 1.23 (95%CI 0.79 to 1.93) for the use of air fresheners during and after pregnancy
    - Lower respiratory tract infections aOR 1.31 (95%CI 0.77 to 2.21) for the use of air fresheners during pregnancy only
- This evidence review found moderate quality evidence from 1 study with 2,292 children showing that the use of air fresheners was associated with
    - wheeze aOR 1.75 (95%CI 1.01 to 3.04) for the use of air fresheners after pregnancy only
    - Lower respiratory tract infections aOR 1.29 (95%CI 1.03 to 1.63)
    - Lower respiratory tract infections aOR 1.85 (95%CI 1.04 to 3.30) for the use of air fresheners after pregnancy only
    - Lower respiratory tract infections aOR 1.59 (95%CI 1.00 to 2.55) for the use of air fresheners during and after pregnancy
- This evidence review found very low quality evidence from 1 study with 3,503 adults showing that the was perfumed or scented products were not associated with wheeze
    - aRR 1.11 (95%CI 0.83 to 1.49) for the use of any perfumed or scented products
    - aRR 1.36 (95%CI 0.98 to 1.88) for the use of air refreshing sprays
- This evidence review found moderate quality evidence from 1 study with 13,971 infants showing that the use of air fresheners during pregnancy was associated with earache in infants
    - aOR 1.24 (95%CI 1.02 to 1.50) for the use of air freshener once a week during pregnancy

  - aOR 1.30 (95%CI 1.09 to 1.54) for the use of air fresheners most days during pregnancy
- This evidence review found moderate quality evidence from 1 study with 14,541 mothers of infants showing that the use of air fresheners was associated with diarrhoea 9 to 21 months after birth
  - aOR 1.14 (95%CI 1.00 to 1.31) for the use of air freshener once a week during pregnancy
  - aOR 1.14 (95%CI 1.01 to 1.28) for the use of air freshener most days during pregnancy
- This evidence review found low quality evidence from 1 study with 13,971 infants showing that the use of air fresheners was not associated with
  - Diarrhoea aOR 1.10 (95%CI 0.99 to 1.23) for the use of air freshener most days during pregnancy,
  - vomiting aOR 1.06 (95%CI 0.93 to 1.20) for the use of air fresheners once a week during pregnancy
  - vomiting aOR 1.09 (95%CI 0.97 to 1.22) for the use of air freshener most days during pregnancy
- This evidence review found moderate quality evidence from 1 study with 13,971 infants showing that the use of air fresheners once a week during pregnancy was associated with diarrhoea aOR 1.20 (95%CI 1.06 to 1.35).
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - People with conditions associated with or exacerbated by indoor air pollution

Home products - Cleaning sprays (Grade F.1.5.6)

- This evidence review found very low quality evidence from 1 study with 633 adults showing that the use of cleaning sprays was not associated with
  - wheeze aOR 1.53 (95%CI 0.88 to 2.65) for low use,
  - aOR 1.34 (95%CI 0.75 to 2.39) for medium use,
  - aOR 1.71 (95%CI 0.80 to 3.67) for high use.
- This evidence review found low quality evidence from 1 study with 1,157 infants showing that the use of cleaning sprays after pregnancy was not associated with wheeze aOR 1.34 (95%CI 0.80 to 2.24).
- This evidence review found moderate quality evidence from 1 study with 1,879 infants showing that that daily use of cleaning sprays was not associated with wheeze aOR 1.50 (95%CI 0.97 to 2.32).
- This evidence review found moderate quality evidence from 1 study with 2,292 infants that the use of cleaning sprays was associated with wheeze
  - aOR 1.37 (95%CI 1.10 to 1.69) for the use of sprays,
  - aOR 1.62 (95%CI 1.11 to 2.36) for the use of sprays during pregnancy only
  - aOR 1.61 (95%CI 1.08 to 2.41) for the use of sprays during and after pregnancy
- This evidence review found low quality evidence from 1 study with 2,292 infants that the use of cleaning sprays after pregnancy was not associated with wheeze aOR 1.37 (95%CI 1.10 to 1.69)

- This evidence review found low quality evidence from 1 study with 683 women showing that the use of 2 or more types of cleaning sprays more than 1 day per week was associated with asthma aOR 1.67 (95%CI 1.08 to 2.56)
- This evidence review found very low quality evidence from 1 study with 683 women showing that the use of cleaning sprays was not associated with asthma aOR 0.68 (95%CI 0.44 to 1.04) for the use of 1 type of cleaning spray more than 1 day per week
- This evidence review found very low quality evidence from 1 study with 1,895 adults showing that the use of household sprays was not associated with asthma
  - aOR 0.70 (95%CI 0.23 to 2.06) for low use of household spray,
  - aOR 0.78 (95%CI 0.26 to 2.36) for medium use of household spray
  - aOR 2.79 (95%CI 0.84 to 9.20) for high use of household spray
- This evidence review found low quality evidence from 1 study with 570 women with asthma showing that the spray use more than 1 day per week was not associated with asthma aOR 1.45 (95%CI 0.94 to 2.24)
- This evidence review found low quality evidence from 1 study with 3,503 adults showing that the use of cleaning sprays was associated with asthma
  - aOR 2.11 (95%CI 1.15 to 3.89) for the use of sprays 4 to 7 days per week,
  - aOR 2.96 (95%CI 1.33 to 6.56) for the use of three or more sprays more than 1 day per week,
  - aOR 2.46 (95%CI 1.26 to 4.80) for the use of furniture sprays,
  - aOR 1.49 (95%CI 1.12 to 1.99) for the use of any spray
- This evidence review found very low quality evidence from 1 study with 3,503 adults the use of household sprays was not associated with asthma
  - aOR 1.28 (95%CI 0.78 to 2.09) for the use of any spray,
  - aOR 0.93 (95%CI 0.51 to 1.67) for the use of sprays 1 to 3 days per week,
  - aOR 0.97 (95%CI 0.53 to 1.77) for use of 1 type of spray more than 1 day per week,
  - aOR 1.47 (95%CI 0.70 to 3.06) for use of 2 types of spray more than 1 day per week,
  - aOR 1.43 (95%CI 0.84 to 2.44) for the use of glass-cleaning sprays,
  - aOR 0.80 (95%CI 0.11 to 5.93) for the use of sprays for carpets, rugs and curtains,
  - aOR 0.93 (95%CI 0.30 to 2.85) for the use of sprays for mopping floors,
  - aOR 0.63 (95%CI 0.09 to 4.64) for the use of oven sprays
  - aOR 1.51 (95%CI 0.46 to 4.96) for the use of ironing sprays
- This evidence review found low quality evidence from 1 study with 3,503 adults showing that the use of cleaning sprays was associated with asthma attacks and / or nocturnal shortness of breath
  - aOR 1.75 (95%CI 1.21 to 2.54) for use of sprays 4 to 7 days per week
  - aOR 2.40 (95%CI 1.47 to 3.91) for the use of 3 or more types of spray more than 1 day per week
- This evidence review found very low quality evidence from 1 study with 3,503 adults showing that the use of sprays was not associated with asthma attacks and / or nocturnal shortness of breath
  - aOR 1.36 (95%CI 0.99 to 1.89) for the use of sprays 1 to 3 days per week,
  - aOR 1.37 (95%CI 0.99 to 1.90) for the use of 1 type of spray more than 1 day per week,

  - aOR 1.45 (95%CI 0.92 to 2.27) for the use of 2 types of spray more than 1 day per week
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women
  - People with conditions associated with or exacerbated by indoor air pollution

Home products - Solvents (Grade F.1.5.7)

- This evidence review found very low quality evidence from 1 study with 3,503 adults that exposure to solvents was not associated with asthma aOR 0.48 (95%CI 0.12 to 1.97) for use of solvents/strain removers
- This evidence review found low quality evidence from 1 study with 3,503 adults showing that exposure to solvents/strain removers was associated with wheeze aRR 2.00 (95%CI 1.30 to 3.07).
- This evidence review found moderate quality evidence from 1 study with 2,292 infants showing that exposure to solvents was associated with
  - wheeze aOR 1.30 (95%CI 1.03 to 1.62)
  - lower respiratory tract infections aOR 1.54 (95%CI 1.11 to 2.14).
- This evidence review found moderate quality evidence from 1 study with 2,292 infants showing that exposure to solvents was not associated with lower respiratory tract infections aOR 1.19 (95%CI 0.95 to1.48)
- This evidence review found very low quality evidence from 1 study with 1,157 infants showing that exposure to solvents was not associated with wheeze
  - Wheeze aOR 1.04 (95%CI 0.71 to 1.51) for prenatal but not postnatal exposure,
  - Wheeze aOR 0.87 (95%CI 0.55 to1.37) for postnatal but not prenatal exposure
  - Wheeze aOR 1.81 (95%CI 0.98 to 3.37) for both prenatal and postnatal exposure.
- This evidence review found low quality evidence from 1 study with 1,505 children up to 2 years of age showing that exposure to solvents was associated with wheeze
  - aOR 1.66 (95%CI 1.11 to 2.47) for postnatal but not prenatal exposure
  - aOR 2.50 (95%CI 1.45 to 4.33) for both prenatal and postnatal exposure
- This evidence review found very low quality evidence from 1 study with 1,505 children up to 2 years of age showing that exposure to solvents was not associated with wheeze
  - aOR 0.89 (95%CI 0.34 to 2.31) for prenatal but not postnatal exposure
- This evidence review found very low quality evidence from 1 study with 1,505 children up to 2 years of age showing that exposure to solvents was not associated with
  - Eczema aOR 0.72 (95%CI 0.35 to 1.50) for prenatal but not postnatal exposure to solvents,
  - Eczema aOR 1.03 (95%CI 0.79 to 1.36) for postnatal but not prenatal exposure to solvents
  - Eczema aOR 1.23 (95%CI 0.84 to 1.82) for both prenatal and postnatal exposure to solvents
  - Food allergies aOR 1.25 (95%CI 0.41 to 3.80) for prenatal but not postnatal exposure to solvents,

- Food allergies aOR 1.28 (95%CI 0.80 to 2.03) for postnatal but not prenatal exposure to solvents
- Food allergies aOR 1.32 (95%CI 0.71 to 2.46) for prenatal and postnatal exposure to solvents

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- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - People with conditions associated with or exacerbated by indoor air pollution

Home products - Aerosols (Grade F.1.5.8)

- This evidence review found moderate quality evidence from 1 study with 14,541 mothers of infants showing that aerosol use once a week during pregnancy was associated with headache
  - aOR 1.16 (95%CI 1.00 to 1.35) at 8 months after the birth
  - aOR 1.35 (95%CI 1.15 to 1.59) at 9 to 21 months after the birth
- This evidence review found moderate quality evidence from 1 study with 14,541 mothers of infants showing that aerosol use most days during pregnancy was associated with headache in mothers
  - aOR 1.25 (95%CI 1.13 to 1.39) at 8 months after the birth
  - aOR 1.21 (95%CI 1.10 to 1.34) at between 9 to 21 months after the birth
- This evidence review found that the use of aerosols most days during pregnancy was not associated with depression at 8 months after giving birth - low quality evidence from 1 study with 14,541 women aOR 1.03 (95%CI 0,91 to 1.17)
- This evidence review found that the use of aerosols once a week during pregnancy was not associated with depression in mothers 8 months after the birth - low quality evidence from 1 study with 14,541 women aOR 1.06 (95%CI 0.88 to 1.27)
- This evidence review found low and moderate quality evidence from 1 study with 14,541 mothers of infants showing that exposure to aerosols was not associated with influenza in mothers 9 to 21 months after the birth
  - aOR 1.03 (95%CI 0.85 to 1.24) for aerosol use once a week during pregnancy
  - aOR 0.87 (95%CI 0.77 to 0.99) for aerosol use daily or most days during pregnancy
- This evidence review found low quality evidence from 1 study with 13,971 infants showing that that exposure to aerosols during pregnancy was not associated with earache in infants
  - aOR 1.00 (95%CI 0.78 to 1.29) for aerosol use once a week during pregnancy
  - aOR 1.05 (95%CI 0.84 to 1.25) for aerosol use daily or most days during pregnancy
- This evidence review found moderate quality evidence from 1 study with 13,971 infants showing that exposure to aerosols was associated with diarrhoea aOR 1.22 (95%CI 1.09 to 1.36) for aerosol use daily or most days during pregnancy
- This evidence review found low quality evidence from 1 study with 13,971 infants showing that exposure to aerosols was not associated with diarrhoea aOR 1.09 (95%CI 0.93 to 1.28) for aerosol use once a week during pregnancy

- This evidence review found moderate quality evidence from 1 study with 13,971 infants showing that exposure to aerosols was associated with vomiting
  - aOR 1.17 (95%CI 1.00 to 1.37) for aerosol use once a week during pregnancy
  - aOR 1.14 (95%CI 1.02 to 1.27) for aerosol use daily or most days during pregnancy
- This evidence review found low quality evidence from 1 study with 14,541 mothers of infants that exposure to aerosols was associated with urinary tract infections in mothers 9 to 21 months after the birth aOR 1.23 (95%CI 1.04 to 1.45) for aerosol use daily or most days during pregnancy
- This evidence review found moderate quality evidence from 1 study with 14,541 mothers of infants that exposure to aerosols was not associated with urinary tract infections in mothers 9 to 21 months after the birth aOR 1.16 (95%CI 0.89 to 1.52) for aerosol use once a week during pregnancy
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - People with conditions associated with or exacerbated by indoor air pollution

Paint (Grade F.1.5.9)

- This evidence review found moderate quality evidence from 1 study with 465 infants showing that exposure to paint fumes was not associated with recurrent wheeze
  - aOR 2.35 (95%CI 0.89 to 6.20) for exposure during pregnancy
  - aOR 2.53 (95%CI 0.85 to 7.49) for exposure during 1st year of life
- This evidence review found high quality evidence from 1 study with 465 infants that exposure to paint fumes during pregnancy was associated with obstructive bronchitis in first of life aOR 5.46 (95%CI 1.09 to 27.20)
- This evidence review found high quality evidence from 1 study with 20,103 women that exposure to paint fumes in first trimester of pregnancy was associated with congenital renal anomalies aOR 2.16 (95%CI 1.02 to 4.58) for exposure
- This evidence review found moderate quality evidence from 1 study with 20,103 women showing that exposure to paint fumes in first trimester of pregnancy was not associated with
  - congenital anomalies (all) aOR 0.95 (95%CI 0.74 to 1.21),
  - aOR 2.19 (95%CI 0.76 to 6.32) for congenital anomalies to the nervous system),
  - aOR 1.79 (95%CI 0.70 to 4.57) for congenital anomalies to the eyes,
  - aOR 2.15 (95%CI 0.84 to 5.55) for congenital anomalies to the ear, face and neck),
  - aOR 0.76 (95%CI 0.39 to 1.49) for heat defects,
  - aOR 1.13 (95%CI 0.27 to 4.79) for congenital anomalies to the respiratory system,
  - aOR 1.06 (95%CI 0.33 to 3.46) for cleft lip and cleft palate,
  - aOR 0.61 (95%CI 0.15 to 2.50) for congenital anomalies to the digestive system,
  - aOR 0.83 (95%CI 0.48 to 1.43) for congenital anomalies to the genitals,
  - aOR 0.82 (95%CI 0.54 to 1.24) for limb defects,
  - aOR 1.77 (95%CI 0.75 to 4.16) for congenital anomalies to the muscular and skeletal,

  - aOR 1.24 (95%CI 0.62 to 2.46) for other congenital anomalies.
- This evidence review found moderate quality evidence from 1 study with 19,000 women that exposure to paint fumes during pregnancy was not associated with
  - small for gestational age aOR 0.89 (95%CI 0.81 to 0.98)
  - pre-term birth aOR 0.95 (95%CI 0.82 to 1.11)
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - People with conditions associated with or exacerbated by indoor air pollution

Any type of redecoration (Grade F.1.5.10)

- This evidence review found moderate quality evidence from 1 study with 465 infants showing that redecoration during pregnancy was associated with recurrent wheeze aOR 2.04 (95%CI 0.78 to 5.28).
- This evidence review found moderate quality evidence from 2 studies with 2344 infants showing that redecoration in the first year of life was associated with recurrent wheeze aOR 1.22 (95%CI 0.96 to 1.54) in the first study with 1879 infants and aOR 1.89 (95%CI 0.71 to 5.06) in the second study with 465 infants.
- This evidence review found low quality evidence from 1 study with 475 premature infants at risk of allergies that exposure to redecoration during pregnancy was associated with pulmonary infections aOR 5.6 (95%CI 1.3 to 24.0)
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - People with conditions associated with or exacerbated by indoor air pollution

Building characteristics and health outcomes

Building age (Grade F.1.6.1)

- This evidence review found moderate quality evidence from 1 study with 540 children that building age was associated with recurrent wheeze
  - aOR 1.69 (95%CI 1.01 to 2.89) for buildings built between 1940 and 1975 in Sweden
  - aOR 1.86 (95%CI 1.05 to 3.27) for buildings built after 1975 in Sweden compared to houses built before 1940.
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities

- Pregnant women
- People with conditions associated with or exacerbated by indoor air pollution

Dwelling size (Grade F.1.6.2)

- This evidence review found very low quality evidence from 1 study with1,137 children showing that dwelling size was not associated with lower respiratory tract infections aOR 0.99 (95%CI 0.92 to 1.06) per room increase in household

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- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women
  - People with conditions associated with or exacerbated by indoor air pollution

Central air conditioning (Grade F.1.6.3)

- This evidence review found high quality evidence from 1 study with 176 children showing that central air conditioning was protective against asthma aOR 0.3 (95%CI 0.14 to 0.83)
- This evidence review found moderate quality evidence from 1 study with 813 infants showing that central air conditioning was not associated with
  - any episodes of earache aOR 0.52 (95%CI 0.27 to 1.03)
  - recurrent earache (four or more episodes separated by 21 days in 1 year) aOR 0.93 (95%CI 0.77 to 1.11)
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women
  - People with conditions associated with or exacerbated by indoor air pollution

Ventilation rate (Grade F.1.6.4)

- This evidence review found very low quality evidence from 1 study with 400 children showing that ventilation rate was not associated with asthma and allergic symptoms
  - aOR 1.17 (95%CI 0.57 to 2.42) for ventilation rate (third quartile versus fourth quartile),
  - aOR 1.35 (95%CI 0.66 to 2.74) for ventilation rate (second quartile versus fourth quartile)
  - aOR 1.95 (95%CI 0.94 to 4.04) for ventilation rate (first quartile versus fourth quartile)
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas

- Older people
- People with disabilities
- Pregnant women
- People with conditions associated with or exacerbated by indoor air pollution

Proximity to traffic – Traffic intensity (Grade F.1.6.5)

- This evidence review found high and moderate quality evidence from 1 study with 7,898 children that for 8,640 or more cars per day within 100m of the birth address was not associated with obstructive bronchiolitis aHR 1.0 (95%CI 0.9 to1.2)
- This evidence review found high and moderate quality evidence from 1 study with 7,898 children that for 8,640 or more cars per day within 100m of the birth address was protective against bronchiolitis aHR 0.7 (95%CI 0.6 to 0.9)
- This evidence review found high and moderate quality evidence from 1 study with 7,898 children that for 8,640 or more cars per day with 100m of the birth address and had never moved was not associated with
  - bronchiolitis aHR 0.7 (95%CI 0.6 to 0.9)
  - obstructive bronchiolitis aHR 1.0 (95%CI 0.8 to 1.2)
- This evidence review found high quality evidence from 1 study with 7,898 children showing that proximity to traffic was not associated with asthma
  - aHR 0.7 (95%CI 0.6 to 0.9) for 8,640 or more cars per day with 100m of the birth address
  - aHR 0.7 (95%CI 0.6 to 0.9) for 8,640 or more cars per day with 100m of the birth address and never moved
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women
  - People with conditions associated with or exacerbated by indoor air pollution

Located within 50 m of major traffic (Grade F.1.6.6)

- This evidence review found moderate quality evidence from 1 study with 2,628 adults showing that the location of the dwelling within 50 metres of a major road was associated with wheeze aOR 1.31 (95%CI 1.00 to 1.71)
- This evidence review found moderate quality evidence from 1 study with 71,271 women showing that the location of the dwelling within 50 metres of a major road was not associated with anxiety symptoms aOR 1.01 (95%CI 0.95 to 1.08)
- This evidence review found low quality evidence from 1 study with 2,628 adults showing that the location of the dwelling within 50 metres of a major road was not associated with
  - chronic cough aOR 1.24 (95%CI 0.92 to 1.68)
  - chronic phlegm aOR 1.18 (95%CI 0.88 to 1.56)

- This evidence review found low quality evidence from 1 study with 3,577 children showing that the location of the dwelling within 50 metres of a major road was not associated with
  - cough without infection aOR 0.74 (95%CI 0.55 to 1.00),
  - dry cough at night aOR 0.84 (95%CI 0.61 to 1.16),
  - wheeze aOR 1.14 (95%CI 0.92 to 1.42),
  - sneezing, runny, stuffy nose aOR 1.10 (95%CI 0.87 to 1.39)
  - respiratory infections aOR 1.03 (95%CI 0.86 to 1.23)
  - asthmatic / spastic / obstructive bronchitis aOR 1.12 (95%CI 0.88 to 1.44)
- This evidence review found moderate quality evidence from 1 study with 5,921 children showing that the location of the dwelling within 50 metres of a major road was associated with asthma aOR 1.66 (95%CI 1.01 to 2.59)
- This evidence review found moderate quality evidence from1 study with 68,195 children of pre-school age showing that the location of the dwelling within 50 metres of a major road was associated with asthma aOR 1.25 (95%CI 1.04 to 1.49)
- This evidence review found moderate quality evidence from1 study with 3,297 children showing that the location of the dwelling within 50 metres of a major road was not associated with asthma exacerbations requiring hospitalisations aHR 1.11 (95%CI 0.92 to 1.33)
- This evidence review found low quality evidence from 1 study with 5,921 children showing that the location of the dwelling within 50 metres of a major road was not associated with
  - hay fever aOR 1.16 (95%CI 0.67 to, 2.00)
  - eczema aOR 0.96 (95%CI 0.72 to 1.11)
- This evidence review found that the location of the dwelling within 50 metres of a major road was associated with
  - Coronary Heart Disease (CHD) Mortality/sudden cardiac death - high quality evidence from 1 study with 450,283 adults aRR 1.29 (95%CI 1.18 to 1.41)
  - Coronary Heart Disease (CHD) Mortality/sudden cardiac death - high quality evidence from 1 study with 107,130 women aHR 1.38 (95%CI 1.04 to 1.82)
- This evidence review found high quality evidence from 1 study with 103,650 women showing that the location of the dwelling within 50 metres of a major road was associated with lung cancer incidence aHR 2.01 (95%CI 1.06 to 3.80)
- This evidence review found moderate quality evidence from 1 study with 2,372 adults showing that the location of the dwelling within 50 metres of a major road was not associated with obesity aOR 1.10 (95%CI 0.97 to 1.25)
- This evidence review found moderate quality evidence from 1 study with 85,251 women showing that the location of the dwelling within 50 metres of a major road was not associated with uterine leiomyomata aOR 1.01 (95%CI 0.93 to 1.09)
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women
  - People with conditions associated with or exacerbated by indoor air pollution

Located within 75 m of major traffic (Grade F.1.6.7)

- This evidence review found high quality evidence from 1 study with 5,341 children showing that the location of the dwelling within 75 metres of a major road was associated with
  - asthma (lifetime) aOR 1.29 (95%CI 1.01 to 1.66)
  - wheeze aOR 1.40 (95%CI 1.09 to 1.78)
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women
  - People with conditions associated with or exacerbated by indoor air pollution

Located within 100 m of major traffic (Grade F.1.6.8)

- This evidence review found moderate quality evidence from 1 study with 397 adults who had received a lung transplant that the location of the dwelling within 100 metres of a major road was associated with chronic lung allograft dysfunction aHR 4.72 (95%CI 2.13 to 10.47)
- This evidence review found low quality evidence from 1 study with 6,339 adults showing that the location of the dwelling within 100 metres of a major road was not associated with
  - chronic cough aOR 1.22 (95%CI 0.89 to 1.66)
  - wheeze aOR 1.02 (95%CI 0.84 to 1.25)
  - asthma aOR 1.18 (95%CI 0.95 to 1.46)
- This evidence review found low quality evidence from 1 study with 3,309 pregnant women that the location of the dwelling within 100 metres of a major road was not associated with
  - pre-eclampsia aRR 0.46 (95%CI 0.16 to 1.29),
  - placental abruption aRR 1.75 (95%CI 0.82 to 3.76)
  - small for gestational age aRR 0.91 (95%CI 0.63 to 1.31)
  - stillbirth aRR 1.71 (95%CI 0.56 to 5.23)
- This evidence review found high quality evidence from 1 study with 4,494 adults showing that the location of the dwelling within 100 metres of a major road was associated with coronary artery calcification aOR 1.45 (95%CI 1.15 to 1.82)
- This evidence review found high quality evidence from 1 study with 3,607 adults showing that the location of the dwelling within 100 metres of a major road was associated with diabetes incidence aRR 1.37 (95%CI 1.04 to 1.81)
- This evidence review found moderate quality evidence from 1 study with 121,700 women showing that the location of the dwelling within 100 metres of a major road was not associated with Incident hypertension aHR 1.01 (95%CI 0.88 to 1.15)
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - People with conditions associated with or exacerbated by indoor air pollution

Located within 150 m of major traffic (Grade F.1.6.9)

- This evidence review found that low quality evidence from 1 study with 2,644 adults showing that the location of the dwelling within 150 metres of a major road was not associated with
  - wheezing in the last year aOR 0.86 (95%CI 0.68 to 1.08),
  - COPD aOR 0.97 (95%CI 0.68 to 1.37)
  - bronchial hyper-responsiveness aOR 0.92 (95%CI 0.68 to 1.24)
  - allergic sensitization aOR 0.87 (95%CI 0.70 to 1.07)
- This evidence review found moderate quality evidence from 1 study with 68,195 children showing that the location of the dwelling within 150 metres of a major road was not associated with asthma
  - aOR 1.03 (95%CI 0.98 to 1.09) for pre-school age children
  - aOR 1.04 (95%CI 0.92 to 1.16) for school age children.
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women
  - People with conditions associated with or exacerbated by indoor air pollution

Located within 200 m of major traffic (Grade F.1.6.10)

- This evidence review found high quality evidence from 1 study with 36,294 women showing that the location of the dwelling within 200 metres of a major road was associated with infertility aHR 1.11 (95%CI 1.02 to 1.20)
- This evidence review found high quality evidence from 1 study with 1,405 adults showing that the location of the dwelling within 200 metres of a major road was associated with wheeze aOR1.38 (95%CI 1.06 to 1.80)
- This evidence review found moderate quality evidence from 1 study with 1,405 adults showing that the location of the dwelling within 200 metres of a major road was not associated with asthma aOR1.21 (95%CI 0.91 to 1.59)
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women
  - Children and young people
  - People with conditions associated with or exacerbated by indoor air pollution

Individual characteristics and health outcomes

Tenancy status (Grade F.1.7.1)

- This evidence review found moderate quality evidence from 1 study with 7,640 adults showing that tenancy status was associated with
  - eye irritation aOR 2.07 (95%CI 1.19 to 3.58) for rented (versus owner) status
  - nasal irritation aOR 2.07 (95%CI 1.33 to 3.20) for rented (versus owner) status
- This evidence review found that low quality evidence from 1 study with 7,640 adults showing that tenancy status was not associated with
  - cough aOR 1.85 (95%CI 0.94 to 3.65) for rented (versus owner) status
  - throat irritation aOR 1.98 (95%CI 0.98 to 3.97) for rented (versus owner) status
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women
  - Children and young people
  - People with conditions associated with or exacerbated by indoor air pollution

Household occupant density (Grade F.1.7.2)

- This evidence review found low quality evidence from 1 study with 416 infants that higher occupancy (4 or more people per household) was associated with bronchiolitis requiring hospitalisation aOR1.75 (95%CI 1.36 to 2.13)
- This evidence review found moderate quality evidence from 1 study with 2,779 children showing that occupancy was not associated with newly diagnosed asthma aOR 1.48 (95%CI 0.86 to 2.57) for multi-family household
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women
  - People with conditions associated with or exacerbated by indoor air pollution

Socio-economic status (SES) (Grade F.1.7.3)

- This evidence review found very low quality evidence from 1 study with 1,191 children that socio-economic status (SES) was associated with cough
  - aOR 1.53 (95%CI 1.12 to 2.10) for middle SES (compared to high SES)
  - aOR 3.37 (95%CI 2.01 to 5.71) for low SES (compared to high SES)
- This evidence review found very low quality evidence from 1 study with 1,191 children that SES was associated with asthmatic symptoms
  - aOR 1.43 (95%CI 1.00 to 2.04) for middle SES compared to high SES households

    - aOR 3.32 (95%CI 1.88 to 5.93) for low SES compared to high SES household
- No evidence was identified for the following subgroups of interest
    - People living in deprived areas
    - Older people
    - People with disabilities
    - Pregnant women
    - People with conditions associated with or exacerbated by indoor air pollution

Association between exposure levels and health outcomes

Public health evidence

Summary of public health studies included in the evidence review

A summary of the characteristics of the included studies are in the following table

1 **Table 3: Characteristics of included studies**

Study (country)	Design	Population	Exposure	Outcomes	Risk of bias
1. Belanger 2003 (US)	Prospective cohort	Infants	NO_2	Cough, Wheeze	Moderate
2. Belanger 2013 (US)	Prospective cohort	Children	NO_2	Asthma, Wheeze	Low
3. Bertelsen 2010	Prospective cohort	Children	Cat allergen	Asthma, bronchial hyperresponsiveness	Low
4. Brussee 2005 (The Netherlands)	Prospective cohort	Children	House dust	Asthma, Wheeze	Low
5. Casas 2015 (4 EU countries)	Prospective cohort	Children	HDM allergen	Asthma, Persistent wheeze	Low
6. Cho 2006 (US)	Prospective cohort	Infants	House dust	Wheeze	Moderate
7. Cole Johnson 2004 (US)	Prospective cohort	Children	Allergen	Asthma	Low
8. Cullinan 2004 (UK)	Prospective cohort	Children	Allergen	Wheeze	Low
9. Dales 1991	Retrospective cohort	Adults	Damp / mould	Respiratory symptoms, chronic respiratory disease, asthma, eye irritation	High
10. Diez 2002 (Germany)	Nested case control	Children at risk of allergies	VOCs	Pulmonary infections	Moderate
11. Emenius 2004 (Sweden)	Nested case control	Children	NO_2	Recurrent wheezing	Moderate
12. Gent 2009 (US)	Prospective cohort	Children with asthma	Allergens	Wheeze, Asthma exacerbations	Low
13. Gent 2012 (US)	Prospective cohort	Children with asthma	Allergens	Wheeze, Persistent cough, Asthma exacerbations	Moderate
14. Habre 2014 (US)	Prospective cohort	Children with asthma	$PM_{2.5}$	Cough, Wheeze	Moderate
15. Hansel 2008 (US)	Prospective cohort	Children with asthma	NO_2	Asthma symptoms	Low
16. Harris 2007 (UK)	Prospective cohort	Children	Allergens	Eczema	Low
17. Hunt 2011 (US)	Cohort	Infants at risk of asthma	$PM_{2.5}$	Wheeze	Low
18. Iossifova 2009 (US)	Prospective cohort	Children	Mould	Wheeze	Low

Study (country)	Design	Population	Exposure	Outcomes	Risk of bias
19. Jedrychowski 2011 (Poland)	Prospective cohort	Infants	$PM_{2.5}$	Eczema	Moderate
20. Jung 2012 (US)	Prospective cohort	Children	PAHs	Asthma, Wheeze	Moderate
21. Jung 2012 b (US)	Prospective cohort	Children	$PM_{2.5}$	Wheeze	Moderate
22. Jung 2014 (US)	Prospective cohort	Children	VOCs	Asthma	Moderate
23. Lau 2000 (Germany)	Prospective cohort	Children at risk of asthma	Allergens	Asthma, Wheeze	Low
24. Litonjua 2002 (US)	Prospective cohort	Children at risk of atopy	Allergens	Wheeze	Moderate
25. Lynch 2014 (US)	Prospective cohort	Children at risk of atopy	Allergens	Wheeze	Low
26. McCormack 2009 (US)	Prospective cohort	Children with asthma	Particulate matter	Asthma symptoms	Moderate
27. O'Connor 2017 US)	Prospective cohort	Children at risk of asthma	Allergens, NO_2	Asthma	Low
28. Raaschou-Nielsen 2010 (Denmark)	Prospective cohort	Infants at risk of asthma	Particulate matter, NoO2, Formaldehyde	Wheezing	Moderate
29. Roda 2011 (France)	Prospective cohort	Infants	$PM_{2.5}$	Cough, Wheeze without cold, asthma, Allergic rhinitis, Breathlessness, Chest tightness, Cardiac disease, Hypertension, Stroke, Heart infarction or angina pectoris	Moderate
30. Stark 2003 (US)	Prospective cohort	Infants	Fungal spores	Lower respiratory illness	Low
31. Torrent 2007	Prospective cohort	Infants	Allergens, Nitrogen dioxide	Asthma, wheeze	Low

See appendix D for full evidence tables.

Quality assessment of clinical studies included in the evidence review

See appendix F for full GRADE tables.

Economic evidence

No economic evidence review was carried out for this review

Economic model

No economic evidence modelling was carried out for this review

Evidence statements

Damp

Damp (Grade F.2.1.1)

- This evidence review found low quality evidence from 1 study with 7,320 adults showing that exposure to marked dampness was associated with
    - cough and phlegm aRR 2.73 (95%CI 1.88 to 3.99)
    - phlegm aOR 2.05 (95%CI 1.07 to 3.91)
- This evidence review found very low quality evidence from 1 study of 7,320 adults showing that exposure to marked dampness was not associated with cough aRR 0.85 (95%CI 0.67 to 1.09)
- This evidence review found very low quality evidence from 1 study of 7,320 adults showing that exposure to slight to moderate dampness was not associated with
    - Cough aRR 1.26 (95%CI 0.80 to1.99)
    - cough and phlegm aRR.1.24 (95%CI 0.99 to 1.56)
    - phlegm aOR 0.82 (95%CI 0.54 to 1.27)
- This evidence review found moderate quality evidence from 1 study with 369 children showing that exposure to damp or mould was associated with wheeze IRR[a] 1.67 (95%CI 1.39 to 2.01)
- This evidence review found moderate quality evidence from 1 study with 322 infants showing that exposure to damp or mould was associated with wheeze aHR 1.22 (95%CI 1.07 to 1.40)
- This evidence review found moderate quality evidence from 1 study with 7,104 adults (showing that exposure to damp was associated with asthma aRR 1.49 (95%CI 1.00 to 2.22)
- This evidence review found moderate quality evidence from 1 study with 398 children showing that exposure to major moisture damage or any damage with mould in the child's main living area was not associated with cough aOR 1.27 (95%CI 0.77 to 2,09)
- This evidence review found low quality evidence from 1 study with 14,799 adults showing that exposure to dampness and mould was associated with
    - chronic respiratory disease aOR 1.45 (95%CI 1.29 to 1.64)
    - lower respiratory symptoms aOR 1.62 (95%CI 1.48 to 1.78)

[a] IRR: incidence rate ratio

  - upper respiratory symptoms aOR 1.50 (95%CI 1.38 to 1.61)
  - asthma aOR 1.56 (95%CI 1.25 to 1.95)
- This evidence review found high quality evidence from 1 study with 1,765 infants showing that exposure to damp was associated with
  - wheeze aOR 2.12 (95%CI 1.30 to 3.46)
  - asthma aOR 2.19 (95%CI 1.06 to 4.53)
- This evidence review found moderate quality evidence from 1 study with 1,765 adults showing that exposure to damp was not associated with bronchiolitis aOR 1.32 (95%CI 0.80 to 2.18)
- This evidence review found low quality evidence from 1 study with 4,625 children showing that exposure to damp was associated with
  - cough aOR 2.16 (95%CI 1.64 to 2.84)
  - asthma aOR 1.42 (95%CI 1.04 to 1.94)
  - bronchitis aOR 1.32 (95%CI 1.05 to 1.67)
  - chest illness aOR 1.52 (95%CI 1.20 to 1.93)
  - non-chest illness aOR 1.55 (95%CI 1.25 to 1.93)
  - wheeze aOR 1.23 (95%CI 1.10 to 1.39)
  - lower respiratory illness aOR 1.68 (95%CI 1.41 to 2.01)
  - upper respiratory illness aOR 1.57 (95%CI 1.31 to 1.74)
- This evidence review found low quality evidence from 1 study with 400 children showing that exposure to damp was not associated with rhinitis
  - aOR 1.39 (95%CI 0.73 to 2.67) for mild damp stains,
  - aOR 0.37 (95%CI 0.04 to 3.43) for severe damp stains,
  - aOR 1.16 (95%CI 0.36 to 3.76) for mild floor damp,
  - aOR 1.58 (95%CI 0.10 to 26.14) for severe floor damp
- This evidence review found moderate quality evidence from 1 study with 5,078 children showing that exposure to damp was not associated with
  - wheeze aOR 1.11 (95%CI 0.87 to 1.43)
  - asthma aOR 1.16 (95%CI 0.87 to 1.53)
- This evidence review found low quality evidence from 1 study with 6,853 children showing that exposure to damp was not associated with acute respiratory infection requiring hospitalisation
  - aHR 0.95 (95%CI 0.82 to 1.11) for infrequent dampness in the house,
  - aHR 1.08 (95%CI 0.91 to 1.29) for frequent dampness in the house,
  - aHR 1.07 (95%CI 0.84 to 1.37) for always dampness in the house
- This evidence review found moderate quality evidence from 1 study with 6,853 children showing that exposure to mould was protective against acute respiratory infection requiring hospitalisation
  - aHR 0.81 (95%CI 0.67 to 0.99) for mould or mildew in the walls or ceilings of the room where the child sleeps at night in the past 2 weeks
- This evidence review found moderate quality evidence from 1 study with 6,853 children showing that exposure to mould was not associated with acute respiratory infection requiring hospitalisation
  - aHR 0.81 (95%CI 0.67 to 0.99) for mould or mildew in the walls or ceilings of the room where the child sleeps at night in the past 2 weeks,
  - aHR 1.08 (95%CI 0.91 to 1.29) for frequent dampness in the house,
  - aHR 1.07 (95%CI 0.84 to 1.37) for always dampness in the house

- This evidence review found low quality evidence from 1 study of 528 children with asthma showing that exposure to damp was associated with airway hyper-responsiveness aOR 3.95 (95%CI 1.82 to 8.57)
- This evidence review found low quality evidence from 1 study with 593 infants at risk of asthma showing that exposure to mould or mildew was not associated with wheeze aOR 1.22 (95%CI 0.80 to 1.88)
- This evidence review found moderate quality evidence from 1 study with 499 infants at risk of asthma or allergy showing that exposure to water damage, mould or mildew was not associated with lower respiratory illness aOR 1.34 (95%CI 0.99 to 1.82)
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women
  - People with conditions associated with or exacerbated by indoor air pollution

Mould (Grade F.2.1.2)

- This evidence review found high quality evidence from 1 study with 593 infants not at risk of asthma showing that exposure to mould or mildew was associated with cough aOR 1.53 (95%CI 1.01 to 2.30)
- This evidence review found moderate quality evidence from 1 study with 256 infants at risk of allergy showing that exposure to mould or mildew was associated with
  - Wheeze aOR 2.51 (95%CI 1.37 to 4.62)
  - Cough aOR 1.91 (95%CI 1.07 to 3.42)
- This evidence review found low quality evidence from 1 study with 593 infants not at risk of asthma showing that exposure to mould or mildew was not associated with wheeze aOR 1.22 (95%CI 0.80 to 1.88)
- This evidence review found moderate quality evidence from 1 study with 7,104 adults (showing that exposure to mould was not associated with asthma aRR 1.15 (95%CI 0.71 to 1.85)
- The evidence review found low quality evidence from 1 study with 1916 children showing that exposure to mouldy odour was associated with asthma aOR 2.44 [95%CI 1.07 to 5.60)
- This evidence review found low quality evidence from 1 study with 4,625 children showing that exposure to mould was associated with
  - non-chest illness aOR 1.40 (95%CI 1.13 to 1.74)
  - chest illness aOR 1.40 (95%CI 1.11 to 1.78)
  - bronchitis aOR 1.48 (95%CI 1.17 to 1.87)
  - cough aOR 2.12 (95%CI 1.64 to 2.73)
  - hay fever aOR 1.57 (95%CI 1.31 to 1.74)
  - lower respiratory illness aOR 1.57 (95%CI 1.31 to 1.87)
  - wheeze aOR 1.79 (95%CI 1.44 to 2.32)
- This evidence review found moderate quality evidence from 1 study with 4,625 children showing that exposure to mould was not associated with asthma aOR 1.27 (95%CI 0.93 to 1.74)
- This evidence review found low quality evidence from 1 study with 400 children showing that exposure to mild mould was not associated with eczema aOR 1.39 (95%CI 0.73 to 2.67)
- This evidence review found low quality evidence from 1 study with 400 children showing that exposure to severe mould was not associated with eczema aOR 0.37 (95%CI 0.04 to 3.43)

- This evidence review found high quality evidence from 1 study with 483 children with atopy showing that exposure to high levels of visible mould was associated with wheeze aOR 6.16 (95%CI 1.38 to 27.44)
- This evidence review found moderate quality evidence from 1 study with 483 children with atopy showing that exposure to low levels of visible mould was not associated with wheeze aOR 1.86 (95%CI 0.86 to 4.00)
- This evidence review found low quality evidence from 1 study with 1,916 children showing that exposure to mould odour was associated with asthma aOR 2.44 (95%CI 1.07 to 5.60)
- This evidence review found very low quality evidence from 1 study with 1,916 children showing that exposure to visible mould was associated with asthma aOR 0.65 (95%CI 0.24 to 1.72)
- This evidence review found moderate quality evidence from 1 study with 3,798 children showing that exposure to mould was not associated with rhinitis
    - Asthma aOR 1.16 (95%CI 0.93 to 1.44) for single indicator of damp (mould odour or visible mould or dampness damage)
    - aOR 1.03 (95%CI 0.87 to 1.22) for a single indicator of damp (mould odour or visible mould or dampness damage),
    - aOR 1.18 (95%CI 0.92 to 1.52) for two indicators of damp (mould odour or visible mould or dampness damage and
    - aOR 1.23 (95%CI 0.82 to 1.85) for three indicators of damp (mould odour or visible mould or dampness damage)
- This evidence review found moderate quality evidence from 1 study with 3,798 children showing that exposure to mould was associated with asthma
    - aOR 1.37 (95%CI 1.01 to 1.86) for two indicators of damp (mould odour or visible mould or dampness damage)
    - aOR 1.73 (95%CI 1.10 to 2.74) for three indicators of damp (mould odour or visible mould or dampness damage)
- This evidence review found moderate quality evidence from 1 study with 398 children showing that exposure to exposure to minor moisture damage with or without mould spots in child’s main living area was not associated with asthma aOR 1.31 (95%CI 0.72 to 2.36)
- This evidence review found moderate quality evidence from 1 study with 398 children showing that exposure to major moisture damage or any moisture damage with visible mould in child’s main living area was not associated with asthma aOR 1.33 (95%CI 0.60 to 2.98)
- This evidence review found moderate quality evidence from 1 study with 3,535 children with no history of asthma showing that exposure to mould was not associated with asthma aRR 1.10 (95%CI 0.80 to 1.60)
- This evidence review found very low quality evidence from 1 study with 1916 children showing that exposure to visible mould was not associated with asthma aOR 0.65 (95%CI 0.24 to 1.72)
- This evidence review found low quality evidence from 1 study with 1,863 children showing that exposure to mould on walls or visible mould was associated with hay fever (reported as allergic rhinitis) aOR 1.73 (95%CI 1.27 to 2.38) and aOR 1.98 (95%CI 1.32 to 2.99) respectively
- This evidence review found moderate quality evidence from 1 study with 405 children showing that exposure to water damage or mould/mildew in past year was not associated with allergic rhinitis aOR 1.66 (95%CI 0.88 to 3.15)
- This evidence review found very low quality evidence from 1 study with 3,360 children showing that exposure to mould on walls was not associated with allergic rhinoconjunctivitis aOR 1.34 (95%CI 0.64 to 2.79)
- This evidence review found high quality evidence from 1 study with 3,535 children with wheeze at baseline showing that exposure to mould was protective against asthma aRR 0.60 (95%CI 0.40 to 0.90)

- This evidence review found low quality evidence from 1 study with 14,799 adults showing that exposure to damp or mould was associated with eye irritation aOR 1.63 (95%CI 1.46 to 1.82)
- This evidence review found low quality evidence from 1 study with 9,808 adults showing that mouldy odour was associated with
  - eye irritation aOR 3.75 (95%CI 3.60 to 3.92)
  - tiredness aOR 2.38 (95%CI 2.31 to 2.46)
  - headache aOR 3.37 (95%CI 3.24 to 3.51)
  - facial skin symptoms aOR 2.93 (95%CI 2.80 to 3.06)
  - cough aOR 3.30 (95%CI 3.16 to 3.46)
  - nasal symptoms aOR 2.83 (2.73 to 2.93)
  - throat symptoms aOR 3.48 (3.33 to 3.62)
  - tiredness aOR 2.58 (95%CI 2.31 to 2.46)
- This evidence review found low quality evidence from 1 study with 1,719 children showing that exposure to dampness or visible mould was associated with
  - any sleep problems aOR 1.80 (95%CI 1.22 to 2.66)
  - problems sleeping throughout the night aOR 2.36 (95%CI 1.15 to 4.84)
  - sleep less than 9 hours aOR 1.60 (95%CI 1.02 to 2.51)
- This evidence review found low quality evidence from 1 study with 1,719 children showing that exposure to dampness or visible mould was not associated with problems falling asleep aOR 1.50 (95%CI 0.98 to 2.30)
- This evidence review found low quality evidence from 1 study with 1,719 children showing that exposure to visible mould was associated with
  - Any sleep problems aOR 1.70 (95%CI 1.13 to 2.54)
  - Sleep less than 9 hours aOR 1.67 (85%CI 1.06 to 2.65)
- This evidence review found low quality evidence from 1 study with 1,719 children showing that exposure to visible mould was not associated with problems falling asleep aOR 1.50 (95%CI 0.97 to 2.33)
- This evidence review found very low quality evidence from 1 study with 1,719 children showing that exposure to mould was not associated with
  - problems falling asleep aOR 1.50 (95%CI 0.97 to 2.33)
  - problems sleeping throughout the night aOR 1.91 (95%CI 0.89 to 4.13)
- This evidence review found low quality evidence from 1 study with 398 children showing that exposure to mould or mildew was not associated with wheeze aOR 1.34 (95%CI 0.90 to 2.01)
- This evidence review found low quality evidence from 1 study with 6,853 children showing that exposure to mould was protective against acute respiratory infection aOR 0.81 (95%CI 0.67 to 0.99)
- This evidence review found low quality evidence from 1 study with 1,002 infants at risk of asthma showing that exposure to mould was not associated with earache aOR 1.37 (95%CI 0.94 to 2.02)
- This evidence review found moderate quality evidence from 1 study with 813 infants showing that exposure to mould was not associated with
  - any episode of earache aOR 1.15 (95%CI 0.87 to 1.99)
  - recurrent earache (four or more episodes separated by 21 days in 1 year) aOR 1.05 (95%CI 0.88 to 1.26)
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people

  - People with disabilities
  - Pregnant women

Fungal spore levels (Grade F.2.1.3)

- This evidence review found high quality evidence from 1 study with 499 infants at risk of asthma showing that exposure to damp/mould/fungi was associated with lower respiratory illness aOR 1.86 (95%CI 1.21 to 2.88) for greater than 90th percentile for specific taxon
- This evidence review found low quality evidence from 1 study with 1,233 children with asthma showing that exposure to Cladosporium >148 CFU/m^3 was not associated with
  - cough aOR 0.98 (95%CI 0.54 to 1.80)
  - wheeze aOR 1.22 (95%CI 0.66 to 2.26)
  - asthma severity aOR 1.58 (95%CI 0.88 to 2.83)
  - asthma exacerbations (reported as rescue medication use) aOR 0.69 (95%CI 0.37 to 1.29)
- This evidence review found low quality evidence from 1 study with 1,002 infants at risk of asthma showing that exposure to fungi was not associated with earache in the 1st 6 months of life
  - aOR 1.27 (95%CI 0.56 to 2.86) for penicillium ≥1000 CFU/m^3,
  - aOR 1.09 (95%CI 0.52 to 2.29) for Cladosporium ≥1000 CFU/m^3
- This evidence review found moderate quality evidence from 1 study with 1,002 infants at risk of asthma showing that exposure to other mould (not yeast, penicillium or cladosporium) ≥1,000 CFU/m^3 was associated with earache in the 1st 6 months of life aOR 3.45 (95%CI 1.36 to 8.76)
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women

Formaldehyde (Grade F.2.2)

- This evidence review found moderate quality evidence from 1 study with 2,940 infants showing that exposure to elevated levels of formaldehyde was associated with
  - lower respiratory tract infections aOR 1.32 (95%CI 1.11 to 1.55) per IQR increase in formaldehyde
  - lower respiratory tract infection with wheeze aOR 1.41 (95%CI 1.14 to 1.74) per IQR increase in formaldehyde
- This evidence review found very low quality evidence from 1 study with 9,808 infants at risk of asthma showing that exposure to elevated levels of formaldehyde was not associated with wheeze
  - aOR 1.11 (95%CI 0.47 to 2.63) for formaldehyde levels between 12.4 and 16.3 μg/m^3 compared to less than 12.4,
  - aOR 1.21 (95%CI 0.51 to 2.92) for formaldehyde levels between 16,3 and 20.3 μg/m^3 compared to less than 12.4,
  - aOR 1.40 (95%CI 0.57 to 3.47) for formaldehyde levels between 20.3 and 25.6 μg/m^3 compared to less than 12.4
  - aOR 0.67 (95%CI 0.29 to 1.54) for formaldehyde levels greater than 25.6 μg/m^3 compared to less than 12.4

- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women
  - People with conditions associated with or exacerbated by indoor air pollution

Allergens

House dust mites (Der p 1 and / or Der f 1) (Grade F.2.3.1)

- This evidence review found low quality evidence from 1 study with 1,233 children with showing that exposure to house dust mite allergens was not associated with asthma exacerbations
  - aOR 1.19 (95%CI 0.92 to 1.55) for Der p 1 + Der f 1 >10 μg/g
- This evidence review found high quality evidence from 1 study with 1,879 infants showing that exposure to house dust mite allergens (levels not specified) was associated with wheeze aOR 1.39 (95%CI 1.12 to 1.73)
- This evidence review found low quality evidence from 1 study with 593 infants not at risk of asthma showing that exposure to house dust mite allergens was not associated with wheeze aOR 0.78 (95%CI 0.55 to 1.13) for Der p 1 + Der f 1 ≥ 2 μg/g
- This evidence review found moderate quality evidence from 1 study with 4,334 children showing that exposure to house dust mite allergens was not associated with wheeze, persistent
  - aOR 1.3 (95%CI 0.8 to 2.2) for Der p 1 + Der f 1 ≥0.19 μg/g to <0.4 μg/g,
  - aOR 1.1 (95%CI 0.8 to 1.5) for Der p 1 +Der f 1 0.4 to <2 μg/g,
  - aOR 0.9 (95%CI 0.7 to 1.3) for Der p 1 + Der f 1 ≥2 μg/g,
- This evidence review found high quality evidence from 1 study with 4,334 children showing that exposure to house dust mite allergens was associated with asthma at 6 years of age or younger
  - aOR 1.4 (95%CI 1.1 to 1.9) for Der p 1 + Der f 1 0.4 to <2 μg/g
- This evidence review found moderate quality evidence from 1 study with 4,334 children showing that exposure to house dust mite allergens was not associated with asthma at 6 years of age or younger
  - aOR 1.6 (95%CI 0.9 to 2.6) for Der p 1 + Der f 1 ≥0.19 μg/g to <0.4 μg/g,
  - aOR 1.1 (95%CI 0.8 to 1.6) for Der p 1 + Der f 1 ?2 μg/g,
- This evidence review found moderate quality evidence from 1 study with 4,334 children showing that exposure to house dust mite allergens was not associated with asthma at older than 6 years
  - aOR 1.3 (95%CI 0.8 to 2.3) for Der p 1 + Der f 1 ≥0.19 μg/g to <0.4 μg/g,
  - aOR 1.1 (95%CI 0.8 to 1.6) for Der p 1 +Der f 1 0.4 to <2 μg/g,
  - aOR 1.0 (95%CI 0.7 to 1.4) for Der p 1 + Der f 1 ?2 μg/g,
- This evidence review found low quality evidence from 1 study with 593 infants not at risk of asthma showing that exposure to house dust mite allergens was not associated with cough aOR 0.76 (95%CI 0.54 to 1.07) for Der p 1 + Der f 1 ≥ 2 μg/g
- This evidence review found low quality evidence from 1 study with 256 infants at risk of asthma showing that exposure to house dust mite allergens was not associated with wheeze aOR 1.04 (95%CI 0.60 to 1.80) for Der p 1 + Der f 1 ≥ 2 μg/g

- This evidence review found moderate quality evidence from 1 study with 1,314 children at risk of asthma showing that exposure to house dust mite allergens was not associated with wheeze aOR 1.03 (95%CI 0.52 to 2.04) for Der p 1 + Der f 1 between 0.981 – 240μg/g
- This evidence review found low quality evidence from 1 study with 256 infants at risk of asthma showing that exposure to house dust mite allergens was not associated with cough aOR 1.27 (95%CI 0.75 to 2.15) for Der p 1 + Der f 1 ≥ 2 μg/g
- No evidence was identified for the following subgroups of interest
    - People living in deprived areas
    - Older people
    - People with disabilities
    - Pregnant women
    - People with conditions associated with or exacerbated by indoor air pollution

Der p 1 (Grade F.2.3.2)

- This evidence review found moderate quality evidence from 1 study with 1,233 children with asthma showing that exposure to house dust mite allergens was associated with
    - asthma exacerbations (reported as rescue mediation use) aOR 1.47 (95%CI 1.11 to 1.94) for exposure to Der p 1 >0.10 μg/g
    - asthma exacerbations (reported as moderate or severe GINA score) aOR 2.93 (95%CI 1.37 to 6.30) for Der p 1 (μg/g) 2.0 to <10.0 vs <0.10 in main living area
- This evidence review found low quality evidence from 1 study with 1,223 children with asthma showing that exposure to house dust mite allergens was not associated with
    - cough aOR 1.18 (95%CI 0.90 to 1.55) for Der p 1 >0.10 μg/g
    - wheeze aOR 1.26 (95%CI 0.95 to 1.67) for Der p 1 >0.10 μg/g
    - asthma exacerbations aOR 1.19 (95%CI 0.92 to 1.55) for Der p 1 >0.10 μg/g

- This evidence review found moderate quality evidence from 1 study with 4,334 children showing that exposure to house dust mite allergens was not associated with wheeze, persistent
    - aOR 1.1 (95%CI 0.7 to 1.8) for Der p 1 ≥0.12 to <0.4 μg/g,
    - aOR 0.9 (95%CI 0.7 to 1.3) for Der p 1 > 0.4 to <2 μg/g,
    - aOR 0.8 (95%CI 0.5 to 1.1) for Der p 1 ≥2 μg/g
- This evidence review found moderate quality evidence from 1 study with 4,334 showing that exposure to house dust mite allergens was not associated with asthma at 6 years of age or younger
    - aOR 1.4 (95%CI 0.9, 2.3) for Der p 1 low to < 2 μg/g
    - aOR 1.1 (95%CI 0.8 to 1.6) for Der p 1 0.4 to < 2 μg/g,
    - aOR 1.0 (95%CI 0.7 to 1.5) for Der p 1 > 2 μg/g,
- This evidence review found moderate quality evidence from 1 study with 4,334 showing that exposure to house dust mite allergens was not associated with asthma at 6 years of age or older
    - aOR 1.1 (95%CI 0.8 to 1.6) for Der p 1 0.4 to < 2 μg/g
    - aOR 0.7 (95%CI 0.4 to 1.0) for Der p 1 > 2 μg/g,
    - aOR 1.4 (95%CI 0.9 to 2.3) for Der p 1 >1.9 μg/g to <0.4 μg/g
- This evidence review found moderate quality evidence from 1 study with 1,611 infants showing that exposure to house dust mite allergens was not associated with asthma
    - aOR 0.67 (95%CI 0.40 to 1.12) for Der p 1 0.83 to 6.46 μg/g

    - aOR 0.68 (95%CI 0.37 to 1.25) for Der p 1 >6.46 µg/g
- This evidence review found moderate quality evidence from 1 study with 593 children showing that exposure to house dust mite allergens was not associated with eczema
    - aOR 1.01 (95%CI 0.53 to 1.92) for Der p 1 0.28 to 0.81 units
    - aOR 1.37 (95%CI 0.74 to 2.55) for Der p 1 0.82 to 2.22 units
    - aOR 0.66 (95%CI 0.34 to 1.29) for Der p 1 2.23 to 7.75 units
    - aOR 0.71 (95%CI 0.37 to 1.37) for Der p 1 7.76 to 384.97 units
- This evidence review found moderate quality evidence from 1 study with 593 children showing that exposure to house dust mite allergens was not associated with visible flexural dermatitis
    - aOR 1.17 (95%CI 0.58 to 2.34) for Der p 1 0.28 to 0.81 units
    - aOR 1.73 (95%CI 0.87 to 3.46) for Der p 1 0.82 to 2.22 units
    - aOR 0.88 (95%CI 0.43 to 1.81) for Der p 1 2.23 to 7.75 units
    - aOR 0.96 (95%CI 0.47 to 1.94) for Der p 1 7.76 to 384.97 units
- This evidence review found moderate quality evidence from 1 study with 300 children with asthma showing that exposure to house dust mites was associated with
    - wheeze aOR 3.58 (95%CI 1.28 to 9.97) for Der p 1 (µg/g) ≥10.0 vs <0.10 in bed
    - asthma exacerbations (reported as controller medication for 9 months or more) aOR 2.52 (95%CI 1.17 to 5.42) for Der p 1 (µg/g) 2.0 to <10.0 vs <0.10 in main living area
    - asthma exacerbations (reported as controller medication for 9 months or more) aOR 2.73 (95%CI 1.32 to 5.64) for Der p 1 (µg/g) 2.0 to <10.0 vs <0.10 in main living area
    - asthma exacerbations (reported as moderate or severe GINA score) aOR 2.55 (95%CI 1.13 to 5.73) for Der p 1 (µg/g) ≥10.0 vs <0.10 in main living area
    - asthma exacerbations (reported as moderate or severe GINA score) aOR 2.93 (95%CI 1.37 to 6.30) for Der p 1 (µg/g) 2.0 to <10.0 vs <0.10 in bed
    - asthma exacerbations (reported as controller medication for 9 months or more) aOR 2.16 (95%CI 1.04 to 4.48) for Der p 1 (µg/g) 2.0 to <10.0 vs <0.10 in bed
- This evidence review found moderate quality evidence from 1 study with 300 children with asthma showing that exposure to house dust mite allergens was not associated with
    - Wheeze aOR 1.05 (95%CI 0.38 to 2.84) for Der p 1 (µg/g) 0.10 to <2.0 vs <0.10 in main living area,
    - Wheeze aOR 1.55 (95%CI 0.52 to 3.85) for Der p 1 (µg/g) 2.0 to <10.0 vs <0.10 in main living area,
    - Wheeze aOR 2.01 (95%CI 0.75 to 5.19) for Der p 1 (µg/g) >10.0 vs <0.10 in main living area,
    - Wheeze aOR 1.70 (95%CI 0.65 to 4.22) for Der p 1 (µg/g) 0.10 to <2.0 vs <0.10 in bed,
    - Wheeze aOR 1.60 (95%CI 0.64 to 4.00) for Der p 1 (µg/g) 2.0 to <10.0 vs <0.10 in bed
    - asthma exacerbations (reported as moderate or severe GINA score) aOR 0.93 (95%CI 0.41 to 2.10) for Der p 1 (µg/g) 0.10 to <2.0 vs <0.10 in main living area
    - asthma exacerbations (reported as controller medication for 9 months or more) aOR 0.61 (95%CI 0.27 to 1.35) for Der p 1 (µg/g) 0.10 to <2.0 vs <0.10 in main living area
    - asthma exacerbations (reported as controller medication for 9 months or more) aOR 2.17 (95%CI 0.97 to 4.86) for Der p 1 (µg/g) >0.10 in main living area
    - asthma exacerbations (reported as moderate or severe GINA score) aOR 0.99 (95%CI 0.47 to 2.08) for Der p 1 (µg/g) 0.10 to <2.0 vs <0.10 in bed
    - asthma exacerbations (reported as controller medication for 9 months or more) aOR 1.35 (95%CI 0.66 to 2.73) for Der p 1 (µg/g) 0.10 to <2.0 vs <0.10 in bed
    - asthma exacerbations (reported as moderate or severe GINA score) aOR 1.19 (95%CI 0.46 to 3.03) for Der p 1 (µg/g) 10.0 to <2.0 vs <0.10 in bed

- asthma exacerbations (reported as controller medication for 9 months or more) aOR 1.41 (95%CI 0.57 to 3.46) for Der p 1 (μg/g) ≥10.0 to <2.0 vs <0.10 in bed
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women

Der f 1 (Grade F.2.3.3)

- This evidence review found low quality evidence from 1 study with 1,233 children with asthma showing that exposure to house dust mite allergens (Der f 1 >2.10 μg/g) was not associated with
  - asthma exacerbations (reported using Asthma Severity Index) aOR 1.28 (95%CI 0.94 to 1.74)
  - asthma exacerbations (reported as rescue medication use) aOR 1.09 (95%CI 0.78 to 1.51)
- This evidence review found low quality evidence from 1 study with 1,223 children with asthma showing that exposure to house dust mite allergens was not associated with
  - wheeze aOR 0.89 (95%CI 0.63 to 1.24) for Der f 1 >2.1 μg/g
  - cough aOR 0.90 (95%CI 0.65 to 1.25) for Der f 1 >2.1 μg/g
- This evidence review found moderate quality evidence from 1 study with 4,334 children showing that exposure to house dust mite allergens was not associated with wheeze, persistent
  - aOR 1.2 (95%CI 0.8 to 1.8) for Der f 1 ≥0.07 to <0.4 μg/g,
  - aOR 1.1 (95%CI 0.8 to 1.5) for Der f 1 0.4 to <2 μg/g,
  - aOR 1.1 (95%CI 0.8 to 1.6) for Der f 1 ≥2 μg/g,
- This evidence review found moderate quality evidence from 1 study with 4,334 showing that exposure to house dust mite allergens was not associated with asthma at 6 years of age
  - aOR 1.2 (95%CI 0.8 to 1.8) for Der f 1 ≥2 μg/g,
  - aOR 1.2 (96%CI 0.8 to 1.8) for Der f 1 ≥0.07 to < 2 μg/g
  - aOR 1.2 (95%CI 0.8 to 1.6) for Der f 1 1 0.4 to < 2 μg/g
- This evidence review found moderate quality evidence from 1 study with 4,334 showing that exposure to house dust mite allergens was not associated with asthma at 6 years of age or older
  - aOR 1.0 (95%CI 0.7 to 1.6) for Der f 1 >2 μg/g,
  - aOR 1.0 (96%CI 0.7 to 1.6) for Der f 1 0.07 ≥ to < 2 μg/g
  - aOR 1.0 (95%CI 0.7 to 1.4) for Der f 1 1 0.4 to < 2 μg/g
- This evidence review found high quality evidence from 1 study with 4,334 children showing that exposure to house dust mite allergens was not associated with asthma at 6 years of age or older
  - aOR 1.1 (95%CI 0.8 to 1.6) for Der f 1 0.4 to <2 μg/g)
  - aOR 1.0 (95%CI 0.7 to 1.5) for Der f 1 > 2 μg/g
  - aOR 1.2 (95%CI 0.8 to 1.8) for Der f 1 >0.07 to <0.4 μg/g)
  - aOR 1.2 (95%CI 0.8 to 1.6) for Der f 1 0.4 to <2 μg/g
- This evidence review found showing moderate quality evidence from 1 study with 442 children at risk of developing asthma that exposure to house dust mite allergens (per interquartile increase in Der f 1) at 3 months of age was not associated with asthma aOR 0.98 (95%CI 0.91 to 1.04)

- This evidence review found low quality evidence from 1 study with 560 children at risk of atopy showing that exposure to house dust mite allergens (Der f 1) in first year of life was not associated with wheeze at 3 years aOR 0.92 (95%CI 0.73 to 1.15) per 1-log increase in allergen level.
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women
  - People with conditions associated with or exacerbated by indoor air pollution

Cat allergens (Fel d 1) (Grade F.2.3.4)

- This evidence review found high quality evidence from 1 study of 260 children showing that exposure to cat allergens (per 10mg increase in Fel d 1) was associated with
  - bronchial hyper-responsiveness aOR 1.22 (95%CI 1.02 to 1.46)
  - asthma aOR 1.20 (95%CI 1.01 to 1.43)
- This evidence review found low quality evidence from 1 study with 593 infants not at risk of asthma showing that exposure to cat allergens was not associated with
  - wheeze aOR 0.84 (95%CI 0.57 to 1.24)
  - cough aOR 0.81 (95%CI 0.56 to 1.17)
- This evidence review found moderate quality evidence from 1 study with 1,233 children with asthma showing that exposure to cat allergens (Fel d 1 >0.12 μg/g) was associated with
  - asthma exacerbations (reported as rescue medication use) aOR 1.32 (95%CI 1.01 to 1.74)
  - wheeze aOR 1.39 (95%CI 1.05 to 1.84)
- This evidence review found moderate quality evidence from 1 study with 1,233 children with asthma showing that exposure to cat allergens was not associated with
  - cough aOR 0.89 (95%CI 0.68 to 1.17) for Fel d 1 >0.12 μg/g
  - asthma exacerbations (reported as Asthma Severity Index) aOR 1.14 (95%CI 0.88 to 1.47)
- This evidence review found low quality evidence from 1 study with 256 children at risk of asthma showing that exposure to cat allergens was not associated with wheeze aOR 0.64 (95%CI 0.36 to 1.12) for Fel d 1 >1 μg/g
- This evidence review found moderate quality evidence from 1 study with 226 children at risk of atopy that exposure to cat allergens was not associated with
  - wheeze aOR 0.61 (95%CI 0.27 to 1.35)
  - cough aOR 1.13 (95%CI 0.66 to 1.94)
- This evidence review found moderate quality evidence from 1 study with 1,314 children at risk of asthma showing that exposure to cat allergens was not associated with
  - wheeze aOR 1.47 (95%CI 0.72 to 1.26) for Fel d 1 >1 μg/g
  - asthma aOR 1.52 (95%CI 0.64 to 2.62) for Fel d 1 0.216 to 47μg
- This evidence review found low quality evidence from 1 study with 560 children at risk of atopy showing that exposure to cat allergens in the first year of life was protective against wheeze at 3 years aOR 0.71 (95%CI 0.58 to 0.88) per 1-log increase in allergen level in first year
- This evidence review found high quality evidence from 1 study with 360 showing that exposure to cat allergens was associated with asthma
  - aOR 3.33 (95%CI 1.72 to 6.45) for Fel d 1 ≥2 μg/gm
  - aOR 1.20 (95%CI 1.01 to 1.43) per 10 mg increase in Fel d 1
  - aOR 1.20 (95%CI 1.01 to 1.43), per 10mg increase in Fel d 1

- This evidence review found moderate quality evidence from 1 study with 593 children showing that exposure to cat allergens was not associated with eczema
  - aOR 1.42 (95%CI 0.72 to 2.81) for Fel d 1 0.45 to 1.04 units,
  - aOR 1.41 (95%CI 0.71 to 2.79) for Fel d 1 1.05 to 3.33 units,
  - aOR 1.31 (95%CI 0.65 to 2.62) for Fel d 1 3.34 to 44.72 units,
  - aOR 1.41 (95%CI 0.72 to 2.75) for Fel d 1 44.73 to 14151.32 units
- This evidence review found moderate quality evidence from 1 study with 593 children showing that exposure to cat allergens was not associated with visible flexural dermatitis
  - aOR 1.28 (95%CI 0.64 to 2.56) Fel d1 0.45 to 1.04 units
  - aOR 0.75 (95%CI 0.36 to 1.55) Fel d 1 1.05 to 3.33 units
  - aOR 1.18 (95%CI 0.59 to 2.38) Fel d 1 3.34 to 44.72 units
  - aOR 0.96 (95%CI 0.48 to 1.91) Fel d 1 44.73 to 14151.32
- This evidence review found high quality evidence from 1 study with 442 children at risk of developing asthma showing that exposure to cat allergens (per interquartile increase in Fel d 1) at 3 months of age was protective against an asthma diagnosis at 7 years aOR 0.78 (95%CI 0.62 to 0.98)
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women
  - People with conditions associated with or exacerbated by indoor air pollution

Dog allergens (Can d 1) (Grade F.2.3.6)

- This evidence review found high quality evidence from 1 study with 380 infants at risk of asthma that exposure to dog allergens (Can f 1 >2 μg/g) was associated with asthma aOR 3.84 (95%CI 1.79 to 8.22)
- This evidence review found low quality evidence from 1 study with 593 infants not at risk of asthma that exposure to dog allergens (Can f 1 ≥1.8μg/g) was not associated with cough aOR 1.11 (95%CI 0.78 to 1.58)
- This evidence review found low quality evidence from 1 study with 1,233 children with asthma showing that exposure to dog allergens (Can f 1 >1.2 μg/g) was not associated with
  - asthma exacerbations (reported as Asthma Severity Index) aOR 1.15 (95%CI 0.83 to 1.58)
  - asthma exacerbations (reported as rescue medication use) aOR 1.15 (95%CI 0.83 to 1.62)
  - cough aOR 1.11 (95%CI 0.80 to 1.56)
- This evidence review found low quality evidence from 1 study with 256 infants at risk of asthma that exposure to dog allergens (Can f 1 >1.8μg/g) was not associated with cough aOR 0.91 (95%CI 0.53 to 1.56)
- This evidence review found low quality evidence from 1 study with 560 children at risk of atopy that exposure to dog allergens (per 1-log increase in allergen level in first year) was not associated with wheeze at 3 years aOR 1.00 (95%CI 0.79 to 1.28)
- This evidence review found moderate quality evidence from 1 study with 442 children at risk of developing asthma showing that exposure to dog allergens (per interquartile increase in Can d 1) at 3 months of age was not associated with an asthma diagnosis at 7 years aOR 0.62 (95%CI 0.37 to 1.03)
- No evidence was identified for the following subgroups of interest

- People living in deprived areas
- Older people
- People with disabilities
- Pregnant women
- People with conditions associated with or exacerbated by indoor air pollution

Nitrogen dioxide (NO_2) (Grade F.2.4)

- This evidence review found high quality evidence from 1 study with 242 children in multi-family housing showing that exposure to elevated levels of NO_2 was associated with wheeze aOR per 9.74 µg/m^3 increase in NO_2 aOR 1.52 (95%CI 1.04 to 2.21)
- This evidence review found moderate quality evidence from 1 study with 593 infants at risk of asthma showing that exposure to elevated levels of NO_2 was associated with cough aOR 1.21 (95%CI 1.05 to 1.40) per 4.87 µg/m^3 (reported as 10ppb) increase in NO_2
- This evidence review found moderate quality evidence from 1 study with 411 infants at risk of asthma showing that elevated levels of NO_2 were not associated with wheeze
    - aOR 0.66 (95%CI 0.27 to 1.61) for NO_2 levels between 5.2 to 6.8 µg/m^3 compared to less than 5.2,
    - aOR 0.80 (95%CI 0.32 to 2.01) for NO_2 levels between 6.8 to 8.6 µg/m^3 compared to less than 5.2,
    - aOR 1.15 (95%CI 0.40 to 3.32) for NO_2 levels between 8.6 to 11.7 µg/m^3 compared to less than 5.2
    - aOR 0.43 (95%CI 0.15 to 1.18) for NO_2 levels greater than 11.7 µg/m^3 compared to less than 5.2
- This evidence review found moderate quality evidence from 1 study with 1,342 children with asthma showing that exposure elevated levels of nitrogen dioxide (NO_2) were associated with wheeze
    - aOR 1.44 (95%CI 1.11 to 1.86) for NO_2 between 18.23 and 29.35 µg/m^3 and
    - aOR 1.53 (95%CI 1.16 to 2.02) for NO_2 >29.35 µg/m^3
- This evidence review found low quality evidence from 1 study with 1,342 children with asthma showing that elevated levels of NO_2 were not associated with wheeze aOR 1.15 (95%CI 0.90 to 1.45) for NO_2 between 12.36 and 18.23 µg/m^3 aOR
- This evidence review found moderate quality evidence from 1 study with 486 children in single-family housing showing that elevated levels of NO_2 were not associated with wheeze aOR 0.99 (95%CI 0.71 to 1.38) per 9.74 µg/m^3 increase in NO_2
- This evidence review found low quality evidence from 1 study with 1,342 children with asthma that NO_2 levels between 12.36 and 18.23 µg/m^3 were not associated with asthma exacerbations aOR 1.15 (95%CI 0.94 to 1.42)
- This evidence review found moderate quality evidence from 1 study with 1,342 children with asthma showing that exposure to elevated levels of NO_2) was associated with asthma exacerbations
    - aOR 1.31 (95%CI 1.04 to 1.66) for NO_2 between 18.23 and 29.35 µg/m^3
    - aOR 1.43 (95%CI 1.08 to 1.88) for NO_2 >29.35 µg/m^3
- This evidence review found moderate quality evidence from 1 study with 442 children at risk of developing asthma showing that exposure to NO_2 (per inter quartile increase) at 12 months of age was not associated with asthma diagnosis at 7 years aOR 0.97 (95%CI 0.75 to 1.26)
- No evidence was identified for the following subgroups of interest
    - People living in deprived areas

- Older people
- People with disabilities
- Pregnant women
- People with conditions associated with or exacerbated by indoor air pollution

Polycyclic aromatic hydrocarbons (PAHs) (Grade F.2.5)

- This evidence review found moderate quality evidence from 1 study of 333 infants showing that exposure to elevated levels of PAH (per log unit of PAH concentration in ng/m^3) was associated with
  - wheezing or whistling in the chest irrespective of respiratory infection aOR 3.83 (95%CI 1.18 to 12.43)
  - wheezing without cold aOR 1.96 (95%CI 1.38 to 2.78)
  - cough aOR 1.72 (95%CI 1.02 to 2.92),
  - cough without cold aOR 4.80 (2.73 to 8.44)
  - sore throat aOR 1.27 (95%CI 1.07 to 1.52)
  - earache aOR 1.82 (95%CI 1.03 to 3.23)
- This evidence review found low quality evidence from 1 study of 333 infants showing that prenatal exposure to elevated levels of PAH (per log unit of PAH concentration in ng/m^3) was not associated with
  - barking cough aOR 1.12 (95%CI 0.82 to 1.55)
  - difficult (puffed) breathing aOR 1.23 (95%CI 0.83 to 1.84)
  - runny or stuffy nose aOR 1.11 (95%CI 0.97 to 1.27)
- This evidence review found moderate quality evidence from 1 study with 257 children showing that postnatal exposure to elevated levels of PAH was associated with wheeze aOR 1.61 (95%CI 1.16 to 2.24)
- This evidence review found low quality evidence from 1 study with 257 children showing that prenatal exposure to elevated levels of PAH was not associated with wheeze aOR 1.40 (95%CI 0.97 to 2.03)
- This evidence review found moderate quality evidence from 1 study with 369 children between 1 and 2 years of age showing that prenatal exposure to elevated levels of PAH was associated with wheeze aOR 1.69 (95%CI 1.52 to 1.88)
- This evidence review found low quality evidence from 1 study with 369 children between 3 and 4 years of age showing that prenatal exposure to elevated levels of PAH was not associated with wheeze aOR 0.96 (95%CI 0.84 to 1.09)
- This evidence review found moderate quality evidence from 1 study with 349 children showing that exposure to elevated levels of pyrene was associated with asthma aOR 1.90 (95%CI 1.13 to 3.20)
- This evidence review found low quality evidence from 1 study with 349 children showing that prenatal exposure to pyrene was not associated with wheeze aOR 1.53 (95%CI 0.93 to 2.51)
- This evidence review found low quality evidence from 1 study with 349 children showing that prenatal exposure to Σ_8PAH non-volatile was not associated with wheeze aOR 0.86 (95%CI 0.52 to 1.42)
- This evidence review found low quality evidence from 1 study with 475 premature infants and children at risk of allergies that prenatal exposure to elevated levels of PAH was associated with pulmonary infections
  - aOR 2.1 (95%CI 1.1 to 4.2) for Styrene>2.0 µg/m^3

    - aOR 2.4 (95%CI 1.3 to 4.5) for Benzene > 5.6 μg/m^3
- This evidence review found low quality evidence from 1 study with 349 children showing that prenatal exposure to Σ_8PAH non-volatile was not associated with asthma aOR 0.90 (95%CI 0.52 to 1.56)
- This evidence review found low quality evidence from 1 study with 363 children showing that prenatal exposure to Pyrene was not associated with asthma aRR 0.81 (95%CI 0.59 to 1.12)
- This evidence review found low quality evidence from 1 study with 363 children showing that prenatal exposure to Σ_8PAH non-volatile was not associated with asthma aRR 0.74 (95%CI 0.46 to 1.18)
- This evidence review found low quality evidence from 1 study with 363 children showing that prenatal exposure to Σ_8PAH semi-volatile was not associated with asthma aRR 0.82 (95%CI 0.60 to 1.12)
- This evidence review found low quality evidence from 1 study of 333 infants showing that prenatal exposure to elevated levels of PAH (log unit of PAH concentration in ng/m^3) was associated with earache aOR 1.82 (95%CI 1.03 to 3.23)
- No evidence was identified for the following subgroups of interest
    - People living in deprived areas
    - Older people
    - People with disabilities
    - Pregnant women
    - People with conditions associated with or exacerbated by indoor air pollution

Particulate Matter

$PM_{2.5}$ (Grade F.2.6.1)

- This evidence review found low quality evidence from 1 study with 905 adults showing that $PM_{2.5}$ from residential heating sources was not associated with cough aOR 0.95 (95%CI 0.72 to 1.29)
- This evidence review found moderate quality evidence from 1 study with 322 infants showing that prenatal exposure to $PM_{2.5}$ was not associated with wheeze, aHR 1.06 (95%CI 0.72 to 1.57)
- This evidence review found moderate quality evidence from 1 study with 408 children showing that exposure to $PM_{2.5}$ (per 8.75 μg/m^3 increase) was associated with wheeze aOR 1.51 (95%CI 1.05 to 2.16)
- This evidence review found high quality evidence from 1 study with 103 infants at risk of asthma showing that exposure to $PM_{2.5}$ ≥15μg/m^3 was associated with wheeze aOR 4.21 (95%CI 1.36 to 13.03)
- This evidence review found moderate quality evidence from 1 study with 36 children with asthma showing that exposure to $PM_{2.5}$ was associated with
    - wheeze aOR 1.57 (95%CI 1.09 to 2.26) per 17.3 μg/m^3 increase in indoor $PM_{2.5}$
    - wheeze aOR 1.55 (95%CI 1.05 to 2.28) per 16.5 μg/m^3 increase in indoor $PM_{2.5}$ from indoor sources
- This evidence review found moderate quality evidence from 1 study with 150 children with asthma showing that exposure to $PM_{2.5}$ (per 10 μg/m^3 increase in $PM_{2.5}$) was associated with
    - cough, wheezing or chest tightness aIRR 1.05 (95%CI 1.01 to 1.12)
    - slow down aIRR 1.04 (95%CI 1.0 to 1.09),
    - symptoms with running aIRR 1.07 (95%CI 1.02 to 1.11),
    - nocturnal symptoms aIRR 1.06 (95%CI 1.01 to 1.10),

- limited speech aIRR 1.07 (95%CI 1.00 to 1.14)
- rescue medication use aIRR 1.04 (95%CI 1.01 to 1.08)

- This evidence review found moderate quality evidence from 1 study with 411 infants at risk of asthma showing that exposure to $PM_{2.5}$ was not associated with wheeze
  - aOR 1.32 (95%CI 0.53 to 3.27) for $PM_{2.5}$ between 10.6 and 13.2 μg/m^3,
  - aOR 1.74 (95%CI 0.67 to 4.47) for $PM_{2.5}$ between 13.2 and 16.8 μg/m^3,
  - aOR 0.67 (95%CI 0.28 to 1.59) for $PM_{2.5}$ between 16.8 and 24 μg/m^3
  - aOR 1.02 (95%CI 0.41 to 2.57) for $PM_{2.5}$ greater than 24.1 μg/m^3
- This evidence review found low quality evidence from 1 study with 36 children with asthma showing that exposure to $PM_{2.5}$ was not associated with
  - cough aOR 1.22 (95%CI 0.91 to 1.63) per 17.3 μg/m^3 increase in indoor $PM_{2.5}$
  - cough aOR 1.20 (95%CI 0.88 to 1.64) per 17.6 μg/m^3 increase in indoor $PM_{2.5}$ from indoor sources
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women
  - People with conditions associated with or exacerbated by indoor air pollution

PM_{10} (Grade F.2.6.2)

- This evidence review found moderate quality evidence from 1 study with 150 children with asthma showing that exposure to PM_{10} (per 10 μg/m^3 increase in PM_{10}) was associated with
  - cough, wheezing or chest tightness aIRR 1.06 (95%CI 1.01 to 1.12)
  - slowdown 1.08 (95%CI 1.02 to 1.14)
  - nocturnal symptoms aIRR 1.08 (95%CI 1.01 to 1.14),
  - limited speech aIRR 1.11 (95%CI 1.03 to 1.19)
  - rescue medication use aIRR 1.06 (95%CI 1.01 to 1.10)
- This evidence review found moderate quality evidence from 1 study with 150 children with asthma showing that exposure to PM_{10} (per 10 μg/m^3 increase in PM_{10}) was not associated with symptoms with running –aIRR 1.00 (95%CI 0.94 to 1.08)
- No evidence was identified for the following subgroups of interest
  - People living in deprived areas
  - Older people
  - People with disabilities
  - Pregnant women
  - People with conditions associated with or exacerbated by indoor air pollution

Recommendations

Research recommendations

What are the health risks associated with exposure to sources of particulate matter at home?

Rationale and impact

Link to be added

The committee's discussion of the evidence

Interpreting the evidence

The outcomes that matter most

The committee noted that pollutants such as NO_2, volatile organic compounds (VOCs), particulate matter (PM) from open soild-fuel fires, polycyclic aromatic hydrocarbons (PAHs for example, naphthalene and benzo[a]pyrene) and biological agents such as mould and pet dander are sometimes associated with many symptoms including those affecting the respiratory, cardiovascular and neurological systems

The quality of the evidence

The committee acknowledged the certainty of the evidence was mixed but also noted that this was largely due to different context in each study, such as differences in populations, age, and the myriad of ways of reporting on the same outcome. For example, respiratory symptoms covers different symptoms such coughing, sneezing, wheezing, sinus congestion, phlegm, sore throat, nasal congestion and runny nose.

Many of the studies used self-report rather than objective measures for symptoms. This limited the opportunity to get any pooled estimates of the associations between exposure and symptoms. However, a member of the committee highlighted that where point estimates from different studies showed an association but some of the confidence intervals crossed the line of no effect that the latter is a measure of uncertainty which is reflected in the overall certainty, However the committee considered that this doesn't change the positive association shown in the majority of the studies and this was factored into their decision making.

The committee noted that many of the studies included selected populations, such as those with pre-existing conditions such as asthma or those at risk of developing conditions due to a family history. The remaining studies were in unselected populations of infants, children or adults though there were no studies that included older people or people with disabilities. Associations were less common in studies that used unselected populations than in the studies that used selected populations. Overall the committee noted only limited association between exposure and ill health in the healthy population.

There was limited evidence of pregnancy outcomes of interest, such as low birth weight for gestational age or premature birth, though there were studies including pregnant women.

Benefits and harms

Evidence showed that people with pre-existing conditions for example respiratory or cardiovascular conditions or allergies are particularly affected by indoor air pollutants. While the majority of the evidence showed that indoor pollutants were associated with harms some showed benefits in terms of protecting against poor health. The effects of exposure to poor indoor air quality are generally cough or wheeze, nasal or throat symptoms, and eye irritation.

The committee also noted that women who are pregnant and babies under 12 months are particularly vulnerable to poor health from exposure to some pollutants such as VOC's and particulates. Evidence suggests that exposure to volatile organic compounds (VOCs) during pregnancy was associated with poor health outcomes for the child, for example, cough or wheeze in the first years of life.

The committee noted the importance of recognising signs and symptoms associated with exposure to indoor air pollution was key to action being taken. If these symptoms are associated with poor indoor air quality, then action can be taken by health care professionals in both managing the symptoms and in referring for appropriate assessment of the property in order for the cause to be identified and remedied. If poor indoor air quality is not identified as a cause of the symptoms, the symptoms are likely to worsen with resulting greater impact on the health of the occupants.

The committee discussed that some exposure during the first year of life was associated with asthma diagnosis later in childhood..

Cost effectiveness and resource use

No cost-effectiveness review was conducted for this question as it was not an effectiveness question.

Other factors the committee took into account

As well as the evidence of associating open solid-fuel fires with poor health symptoms, the committee were also made aware of a Public Health England review in this area. The committee noted that some groups are more vulnerable to exposure to poor indoor air quality as shown in the literature review, with emphasis on the very young, those with or at risk of developing respiratory conditions. The committee noted that many of these groups will be in contact with health care professionals already and those who are social tenants will be in contact with other relevant professionals employed by local authorities.

The committee also accepted topic expert advice that knowledge of the health impact of indoor air pollution was low amongst many professionals such as those health enforcement officers and health care professionals and so the committee drafted recommendations to raise awareness around the populations at increased risk and signs and symptoms associated with indoor air pollution. There was no evidence on how effective it is for local authority and health and social care staff to trigger a referral for a housing assessment. The committee agreed that knowledge of how to do this is key to ensuring action is taken. That way, staff can make every contact count and improve people's health. To this end, the committee recommended that local authorities should raise awareness of the referral pathway for a housing assessment.

The committee also highlighted that local authorities should set up a process that their staff as well as health and social care professionals can use to contact the environmental officer if they have concerns about poor indoor air quality. The local authority should ensure that their staff and health and social care professionals are aware of this process and how to request a housing assessment.

There were discussions around symptoms with strong links to poor air quality and the committee highlighted that if people keep presenting with symptoms (such as cough, wheeze, nasal or throat symptoms) or they are getting worse, then these might be linked to their home environment.

The committee noted that healthcare professionals are more likely to see people with pre-existing conditions and women who are pregnant or have very young children. The committee agreed that this puts them in an ideal position to ask about their home and housing conditions and to give advice on how damp, mould and other pollutants such as house dust mites and VOCs from household sprays can affect their health. It also gives them the opportunity to explain how they can reduce the risks or refer people for a housing assessment if necessary. Though the committee stressed that some healthcare professionals might need training on how poor indoor air quality affects health and how to mitigate it. Also asking about housing conditions and making requests for a housing assessment may lead to an increase in consultation time. The committee suggested that training healthcare professionals on poor indoor air quality and its health effects could be incorporated into general training and professional development programmes.

The committee considered whether the problems associated with poor indoor air quality in urban areas were different to those in rural areas. The limited evidence did not show any significant difference in terms of the health impact but noted that the outdoor sources of air pollution may be different.

Appendix A: Review protocol

Field	Content
Review question	What signs and symptoms should prompt healthcare professionals to consider exposure to poor indoor air quality at home in people presenting to health services?
Type of review question	Prognostic type question
Objective of the review	To identify clinical signs and symptoms that are associated with exposure to poor indoor air quality at home.
Eligibility criteria – population/disease/condition/issue /domain	People in all dwellings
Eligibility criteria –prognostic factor	Prognostic factors • Clinical signs / symptoms associated with exposure to indoor air pollutants at home including: • Neurological symptoms for example: headache, drowsiness, fatigue, poor concentration, confusion • Respiratory symptoms for example: coughing, sneezing, wheezing, sinus congestion, phlegm, sore throat, nasal congestion, runny nose • Cardiovascular symptoms for example chest pain, shortness of breath • Nausea • Eye irritation • Signs and symptoms of immune response disorder for example asthma, allergic rhinitis, dermatological conditions for example atopic eczema, psoriasis • Pregnancy related for example low birth weight for gestational age, premature birth, infant mortality (but not sudden infant death (SID)), stillbirth
Outcomes and prioritisation	Risk ratios, odds ratios of exposure to indoor air pollutants at home as defined or reported in the paper
Eligibility criteria – study design	Inclusion: Prospective and retrospective cohort studies Exclusion: Systematic reviews of observational studies will not be included but may be used as a source of primary studies Cross-sectional studies
Other inclusion exclusion criteria	Inclusion: • English language only • Published peer-reviewed studies only • Studies conducted in developed economies similar to the UK • Studies conducted from 1970 onwards • Exclusion:

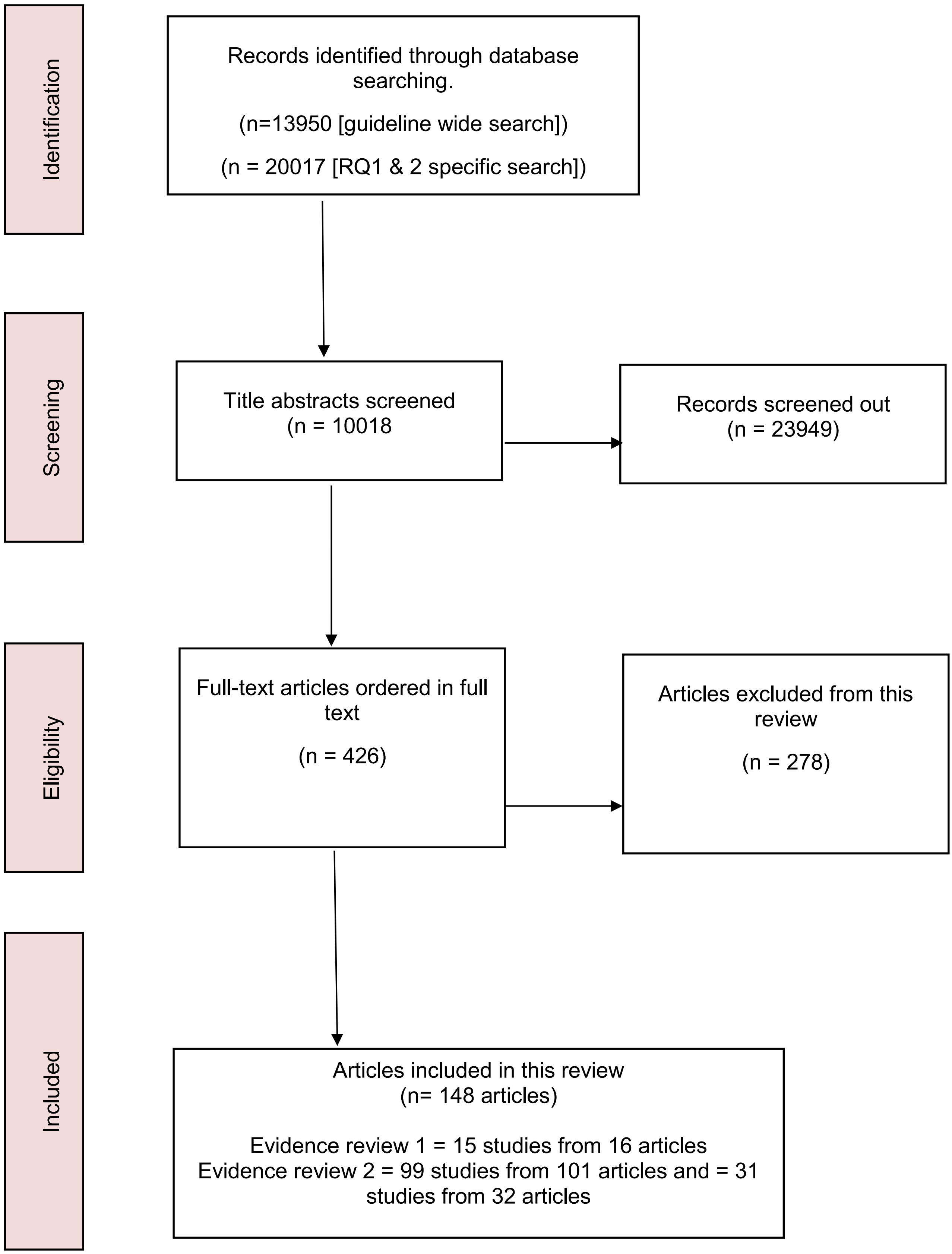
Field	Content
	• Conference abstract, letter, opinion piece, review articles
Proposed sensitivity/sub-group analysis, or meta-regression	Not relevant for this type of review question
Selection process – duplicate screening/selection/analysis	All abstracts will be duplicate screened as a reliability check. Any disagreement will be resolved by discussion, or if necessary, a third independent reviewer. Data extraction and critical appraisal will be checked by a second reviewer. Any disagreements will be resolved by the two reviewers and escalated to a third reviewer if agreement cannot be reached. The inclusion list will be double checked with PHAC to ensure no studies are excluded inappropriately
Information sources – databases	A systematic search of relevant databases will be carried out to identify relevant studies and evidence. Appropriate limits will be applied. Database functionality will be used, where available, to exclude: • Non-English language papers • Animal studies • Editorials, letters, news items and commentaries • Conference abstracts and posters • Theses and dissertations • Duplicates Websites will be browsed or searched to focus on relevant evidence. The bibliographies of relevant reports and findings may also be used to capture evidence. The following databases will be searched: MEDLINE and MEDLINE in Process (OVID) Embase (OVID) Health Management Information Consortium (HMIC) (OVID) Social Policy and Practice (OVID) CENTRAL (Wiley) Cochrane Database of Systematic Reviews (Wiley) DARE (Wiley) Greenfile (EBSCO) NHS EED (legacy database) (Wiley) EconLit (OVID) OpenGrey Web of Science The following websites will be searched: Google and Google scholar (with appropriate limits and looking specifically for reports or evaluations of interventions related to indoor air quality)

Field	Content
Data management (software)	Where feasible data management will be undertaken using EPPI-reviewer software. Quantitative analysis will be performed using R software Where appropriate, qualitative data will be summarised using an appropriate qualitative synthesis approach, for example, narrative synthesis.
Methods for assessing bias at outcome/study level	The risk of bias across eligible studies will be assessed using the standard methodology checklist for prognostic studies. For details please see section 6.4 of Developing NICE guidelines: the manual The Grading of Recommendations Assessment, Development and Evaluation (short GRADE) developed by the GRADE working group http://www.gradeworkinggroup.org/ will be used to assess the quality of evidence across outcomes. Where necessary, GRADE will be modified to meet the needs of the review question. GRADE-CERQUAL will be used for qualitative findings.
Criteria for quantitative synthesis	Data from eligible studies will be extracted for inclusion in evidence tables. For details please see section 6.4 of Developing NICE guidelines: the manual
Methods of quantitative analysis – combining studies and exploring (in)consistency	Data from eligible studies shall be meta-analysed (combined) if studies are judged to be similar enough in terms of population, prognostic factors, outcomes, study design or risk of bias. Where appropriate, inconsistency will be incorporated by performing random-effect analyses If the studies are found to be too heterogeneous to be pooled statistically, a narrative synthesis will be conducted.
Meta-bias assessment – publication bias, selective reporting bias	For details please see section 6.2 of Developing NICE guidelines: the manual.
Confidence in cumulative evidence	For details please see sections 6.4 and 9.1 of Developing NICE guidelines: the manual

Appendix B: Literature search strategies

Please see search strategies here

Appendix C: Public health evidence study selection



Appendix D: Public health evidence tables

D.1.1 Bajeux 2014

<table>
<tr><th>Bibliographic reference</th><th colspan="4">Bajeux E, Cordier S, Garlantézec R et.al (2014) Perinatal exposure to solvents and wheezing, eczema and food allergies at age 2. Occup Environ Med; 71: 636–641.</th></tr>
<tr><td>Study design</td><td colspan="4">Prospective cohort study</td></tr>
<tr><td>Objective</td><td colspan="4">To examine the effects of detailed perinatal solvent exposure on wheezing, eczema and food allergies in children during the first 2 years of life.</td></tr>
<tr><td>Setting/Study location</td><td colspan="4">France</td></tr>
<tr><td>Number of participants</td><td colspan="4">1505 pregnant women</td></tr>
<tr><td>Selected population</td><td colspan="4">No</td></tr>
<tr><td>Participant characteristics</td><td colspan="2">Description
Sex
Male
Age (years) reported as maternal age at birth
Ethnicity
Education
Primary or secondary education
Baccalaureate
Higher education
SES
Building characteristics</td><td colspan="2">

777 (51.7%)
31.0 (4.2)

220 (14.7%)
278 (18.5%)
1003 (66.8%)
Not reported
Not reported</td></tr>
<tr><td>Inclusion criteria</td><td colspan="4">Not reported</td></tr>
<tr><td>Exclusion criteria</td><td colspan="4">Not reported</td></tr>
<tr><td>Type of pollutant/exposure</td><td colspan="4">VOC</td></tr>
<tr><td>Pollutant/exposure assessment</td><td colspan="4">Prenatal domestic exposure corresponds to exposure, self-reported by mothers at inclusion, to chemical products considered to contain solvents (paint, glues, varnishes, wood treatment products, remover products or diluents) at home in the previous 3 months. Women exposed to at least one product classified the child as prenatally exposed
Postnatal exposure was defined by the use, reported by mothers at the 2-year follow-up, of chemical products known to contain solvents (paints, glues, varnishes or solvents themselves) in the home since the child’s birth. The use of at least one product classified the child as postnatally exposed.</td></tr>
<tr><td>Outcome</td><td colspan="4">Wheeze
Eczema
Food allergies</td></tr>
<tr><td rowspan="3">Results</td><td colspan="4">Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between solvent exposures wheezing and eczema</td></tr>
<tr><td></td><td>Wheeze</td><td>Eczema</td><td>Food allergies</td></tr>
<tr><td></td><td>aOR (95%CI)</td><td>aOR (95%CI)</td><td>aOR (95%CI)</td></tr>
</table>

Bibliographic reference	Bajeux E, Cordier S, Garlantézec R et.al (2014) Perinatal exposure to solvents and wheezing, eczema and food allergies at age 2. Occup Environ Med; 71: 636–641.			
	Prenatal domestic exposure	1.34 (0.89, 2.03)	1.13 (0.83, 1.55)	1.11 (0.69, 1.80)
	Postnatal domestic exposure	1.80 (1.25, 2.59)	1.10 (0.86, 1.42)	1.32 (0.86, 2.03)
	Exposed prenatally, not exposed postnatally	0.89 (0.34, 2.31)	0.72 (0.35, 1.50)	1.25 (0.41, 3.80)
	Not exposed prenatally, exposed postnatally	1.66 (1.11, 2.47)	1.03 (0.79, 1.36)	1.28 (0.80, 2.03)
	Exposed both prenatally and postnatally	2.50 (1.45, 4.33)	1.23 (0.84, 1.82)	1.32 (0.71, 2.46)
Follow up	2 years			
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average infant / child in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • self-report Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for family history of asthma or allergy • study controls for any additional factor mother's age child's sex, child's age at follow-up Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias: High** (Concerns over self-report of exposure and outcomes)			
Source of funding	**Government:** National Institute for Public Health Surveillance (InVS), the Ministry of Labor, and the French Agency for Food, Environmental and Occupational Health and Safety (ANSES).			
Comments				

D.1.2 Baker 2006

Bibliographic reference	**Baker R J, Hertz-Picciotto I, Dostal M et.al (2006) Coal Home Heating and Environmental Tobacco Smoke in Relation to Lower Respiratory Illness in Czech Children, from Birth to 3 Years of Age. Environ Health Perspect 114:1126–1132**	
Study design	Prospective cohort study	
Objective	To evaluate how indoor pollution from home heating may adversely affect respiratory health in young children	
Setting/Study location	United States	
Number of participants	452 children	
Selected population	No	
Participant characteristics	Description Sex Male Female Age (years) Ethnicity Education (Mother's education in years) 6–10 11 ≥ 12 Unknown Education (Father's education in years) 6–10 11 ≥ 12 Unknown) SES Building characteristics	250 (55.3%) 202 (44.7%) Not reported Not reported 91 (20.1%) 166 (36.7%) 193 (42.7%) 2 (0.4%) 75 (16.6%) 181 (40.0%) 190 (42.0%) 6 (1.3 Not reported
Inclusion criteria	Only singleton births were included	
Exclusion criteria	Those who had moved to another district, Those who were adopted or in social care, Those who had died).	
Type of pollutant/exposure	Coal heating	
Pollutant/exposure assessment	Structured interview	
Outcome	Lower respiratory illness	
Results	Adjusted risk ratios (aRRs) and 95% confidence intervals (CIs) for association between coal as primary heating fuel and lower respiratory illness	
		Lower respiratory illness
	Heating fuel	aRR (95%CI)
	Coal	1.45 (1.07, 1.97)

Bibliographic reference	**Baker R J, Hertz-Picciotto I, Dostal M et.al (2006) Coal Home Heating and Environmental Tobacco Smoke in Relation to Lower Respiratory Illness in Czech Children, from Birth to 3 Years of Age. Environ Health Perspect 114:1126–1132**
Follow up	3 years
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average child in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • structured interview Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for exposure to environmental tobacco smoke • study controls for additional factors - mother's age, child's sex and year of life, child care attendance, siblings, season, day of the week, and 14-day average temperature.) Outcome Assessment of outcome • record linkage Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias: Low**
Source of funding	**Government:** Czech Ministry of Environment (Teplice Program), the U.S. Environmental Protection Agency; the U.S. Agency for International Development, and the Commission of the European Community
Comments	

D.1.3 Bedard 2014

Bibliographic reference	**Bedard A, Varraso R, Sanchez M, et al (2014) Cleaning sprays, household help and asthma among elderly women. Respiratory medicine 108(1), 171-80**
Study design	Nested case-control study
Objective	To study the relationship between domestic exposure estimates, especially the use of cleaning sprays, and current asthma in elderly women
Setting/Study location	France
Number of participants	570 women
Selected population	Yes – cases selected for asthma

Bibliographic reference	**Bedard A, Varraso R, Sanchez M, et al (2014) Cleaning sprays, household help and asthma among elderly women. Respiratory medicine 108(1), 171-80**	
Participant characteristics	Description	
	Sex	
	Female	570 (100%)
	Age (years) – Mean (SD)	68.2 (6.2)
	Ethnicity	Not reported
	Education	
	<High school diploma	10.0%
	High school to 2-level university diploma	54.2%
	3-Level or 4-level university diploma	17.2%
	5-Level university diploma	18.6%
	SES	Not reported
	Building characteristics	Not reported
Inclusion criteria	Not reported	
Exclusion criteria	Women with missing data for domestic exposure or asthma, and women with non-current asthma were excluded from the analysis. Women with “ever asthma” (according to the main E3N questionnaires) who did not report asthma in the specific respiratory health questionnaire were also excluded	
Type of pollutant/exposure	Domestic use of cleaning sprays	
Pollutant/exposure assessment	Questionnaire	
Outcome	Asthma	
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between domestic self-reported exposure to cleaning products and asthma.	
		Current asthma
		aOR (95%CI)
	Home cleaning ≥1 day/week	0.97 (0.65, 1.46)
	Spray use ≥1 day/week	1.45 (0.94, 2.24)
	Stratified result for women without household help	
	Weekly use of at least one spray	1.86 (1.04, 3.33)
Follow up	Not reported	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • selected group of women with asthma Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • written self-report Demonstration that outcome of interest was not present at start of study • No Comparability Comparability of cohorts on the basis of the design or analysis • study controls for smoking status	

Bibliographic reference	Bedard A, Varraso R, Sanchez M, et al (2014) Cleaning sprays, household help and asthma among elderly women. Respiratory medicine 108(1), 171-80
	• study controls for additional factors - age, education level and BMI Outcome Assessment of outcome • record linkage • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • subjects lost to follow up unlikely to introduce bias - description provided of those lost) **Overall risk of bias: Moderate** (concerns over self-report of exposure)
Source of funding	**Government:** Mutuelle Generale de l'Education Nationale (MGEN), the French League against Cancer (LNCC), the Gustave Roussy Institute (IGR) and the National Institute for Health and Medical Research
Comments	Women who reported home cleaning at least one day per week were considered as exposed for home cleaning. Frequency of nine types of sprays (furniture, glass cleaning, carpets/rugs/curtains, mopping the floor, oven, ironing, air refreshing, degreasing, insecticide/pesticide/anti-dust mite product) was collected Women who reported the use of at least one type of sprays at least one day per week were considered as exposed for spray use. Women exposed to sprays were classified as either weekly exposed to one spray or weekly exposed to at least two sprays. Information on household help (yes, no) was also recorded.

D.1.4 Belanger 2003

Bibliographic reference	Belanger K, Beckett W, Triche E et.al (2003). Symptoms of wheeze and persistent cough in the first year of life: associations with indoor allergens, air contaminants, and maternal history of asthma. American journal of epidemiology, 158(3), pp.195-202.			
Study design	Prospective cohort study			
Objective	To examine the relationship between exposure to dust mite, cockroach, cat, and dog allergen, gas stoves, wood-burning stoves, and mould with wheeze and persistent cough in early infancy			
Setting/Study location	United States			
Number of participants	849 infants. Index child was 2-4 month old)			
Selected population	Yes – selected as at risk of asthma			
Participants characteristics	Description	No.	Wheeze (%)	Persistent cough (%)

Bibliographic reference	**Belanger K, Beckett W, Triche E et.al (2003). Symptoms of wheeze and persistent cough in the first year of life: associations with indoor allergens, air contaminants, and maternal history of asthma. American journal of epidemiology, 158(3), pp.195-202.**					
			<30 days	≥30 days	<30 days	≥30 days
	Sex					
	Male	419	50.8	35.6	38.7	17.4
	Female	430	32.6	8.1	30.5	16.7
	Age	Not reported				
	Ethnicity					
	White	503	33.0	7.9	422	86.8
	Black	117	33.3	13.7	29.9	15.4
	Hispanic	188	37.8	15.4	39.9	22.9
	(Maintenance) medication use	Not reported				
	Parental asthma and/or atopic					
	Mother has asthma					
	No	593	31.7	9.3	32.7	14.8
	Yes	256	39.4	14.4	38.7	22.3
	Father has asthma					
	No	669	35.0	11.1	35.7	16.4
	Yes	171	29.8	9.4	30.4	17.5
	Parental education					
	Mothers education (years)					
	<12	108	43.5	17.6	38.9	25.0
	12–15	445	32.8	11.5	35.1	17.3
	≥16	295	32.5	7.5	32.2	13.9
	Annual family income					
	<$20,000	251	35.1	15.1	33.5	19.9
	$20,000 - $50,000	183	38.2	10.4	36.6	18.0
	>$50,000	415	31.6	8.4	34.2	14.9
	Building characteristics	Not reported				
Inclusion criteria	Only mothers who already had a child under 11 years of age with a physician diagnosis of asthma					
Exclusion criteria	Not reported					
Type of pollutant/exposure	Dust mite Pet dander Mould/mildew NO_2 from gas stove					

Bibliographic reference	**Belanger K, Beckett W, Triche E et.al (2003). Symptoms of wheeze and persistent cough in the first year of life: associations with indoor allergens, air contaminants, and maternal history of asthma. American journal of epidemiology, 158(3), pp.195-202.**				
Pollutant/exposure assessment	Dust samples collected in the index child's bed and in the main living area, usually the site of the highest allergen levels. These samples were analysed for house dust mite and pet allergens. Dust mite: samples analysed for Der p 1 and Der f 1 Pet dander (allergen): Samples analysed for cats (Fel d 1), and dogs (Can f 1). Results are reported in micrograms per gram of fine dust for Der p 1, Der f 1, Fel d 1, and Can f 1. Exposure to dust mite and cat and dog allergens was defined as exposure at ≥2 µg/g. Mould/mildew: Fungal spores were collected by air sampling in both the main living area and the infant's bedroom using a Burkard portable air sampler Nitrogen dioxide (NO_2) from gas stove use was measured using a Palmes tube placed in the main living area for 10–14 days. The effect of nitrogen dioxide exposure is reported for exposure greater than or equal to 10 parts per billion (ppb).				
Outcome	Wheeze and persistent cough				
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for indoor risk factors for wheeze and persistent cough in the first year of life				
		Children whose mothers had asthma (n=256)		Children whose mothers did not have asthma (n=593)	
		Wheeze	Persistent cough	Wheeze	Persistent cough
		OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)
	Dust mite (Der p 1 + Der f 1) ≥2µg/g	1.04 (0.60, 1.80)	1.27 (0.75, 2.15)	0.78 (0.55, 1.13)	0.76 (0.54, 1.07)
	Cat allergen (Fel d 1) ≥1µg/g	0.64 (0.36, 1.12)	1.13 (0.66, 1.94)	0.84 (0.57, 1.24)	0.81 (0.56, 1.17)
	Dog allergen (Can f 1) ≥1.8µg/g	0.69 (0.39, 1.21)	0.91 (0.53, 1.56)	1.03 (0.71, 1.49)	1.11 (0.78, 1.58)
	Gas stove	1.03 (0.59, 1.79)	0.79 (0.46, 1.36)	1.28 (0.88, 1.86)	1.52 (1.06, 2.18)
	Mould/mildew	2.51 (1.37, 4.62)	1.91 (1.07, 3.42)	1.22 (0.80, 1.88)	1.53 (1.01, 2.30)
	Wood stove	Not estimable	1.04 (0.27, 3.97)	0.76 (0.37, 1.55)	1.68 (0.89, 3.20)
	NO_2 >10ppb	Not reported	Not reported	Not reported	1.21 (1.05, 1.40)
Follow up	12 months				

Bibliographic reference	**Belanger K, Beckett W, Triche E et.al (2003). Symptoms of wheeze and persistent cough in the first year of life: associations with indoor allergens, air contaminants, and maternal history of asthma. American journal of epidemiology, 158(3), pp.195-202.**
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average infant at risk of asthma in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • objective sampling Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for smoking in the home • study controls for additional factors as follows maternal education, ethnicity, gender, maternal asthma, paternal asthma, maternal allergies, Annual family income, respiratory illness and smoking during pregnancy Outcome Assessment of outcome • self-report (Parent) Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall level of bias – Moderate** (concerns over self-report of outcomes)
Source of funding	**Government:** The National Institute of Environmental Health Sciences.
Comments	Authors hypothesized that effects of allergens and other environmental factors on respiratory symptoms might differ between infants whose mothers had a history of physician diagnosed asthma (n=256) and children whose mothers did not (n=593). Study found no increased risk of wheeze associated with exposure to house dust mite, cat, or dog allergen. Using the home interview and quarterly questionnaires, days of wheeze and persistent cough reported for each month were summed for 12 months, and the variables were analysed as none, <30 days, or ≥30 days. This was done to distinguish children who had symptoms from those who did not and children with mild symptoms from those with severe symptoms. The choice of 30 days as the cut-off for severe symptoms was made a priori and was based on an asthma severity index developed in this cohort

D.1.51 Belanger 2006

Bibliographic reference	**Belanger K, Gent J F, Triche E W et.al (2006). Association of indoor nitrogen dioxide exposure with respiratory symptoms in children with asthma. American journal of respiratory and critical care medicine, 173(3), pp.297-303**				
Study design	Prospective cohort study				
Objective	To examine the associations of indoor NO_2 exposure with respiratory symptoms among children with asthma.				
Setting/Study location	United States				
Number of participants	728 children younger than 12 year				
Selected population	Yes – all had asthma				
Participant characteristics	Description	Multi-family housing		Single-family housing	
		No.	%	No.	%
	Sex				
	Male	151	62.4	307	63.2
	Female	91	37.6	178	36.8
	Age (years)				
	< 6	161	66.5	310	63.8
	≥ 6	81	33.5	176	36.2
	Ethnicity				
	White, Asian, other	68	28.1	422	86.8
	Black	44	18.2	30	6.2
	Hispanic	130	53.7	34	7.0
	Maintenance medication use				
	Yes	94	38.8	276	56.8
	No	148	61.2	210	43.2
	Parental asthma and/or atopic	Not reported		Not reported	
	Parental education (years)	Not reported		Not reported	
	Annual family income	Not reported		Not reported	
	Building characteristics				
	No. rooms in home				
	< 6	203	83.9	85	17.6
	≥ 6	39	16.1	398	82.4
	Mould/mildew				
	Yes	95	39.4	215	44.3
	No	146	60.6	270	55.7

<table>
<tr><th>Bibliographic reference</th><th colspan="5">Belanger K, Gent J F, Triche E W et.al (2006). Association of indoor nitrogen dioxide exposure with respiratory symptoms in children with asthma. American journal of respiratory and critical care medicine, 173(3), pp.297-303</th></tr>
<tr><td></td><td colspan="5">Water leaks</td></tr>
<tr><td></td><td>Yes</td><td>72</td><td>29.8</td><td>167</td><td>34.4</td></tr>
<tr><td></td><td>No</td><td>170</td><td>70.2</td><td>318</td><td>65.6</td></tr>
<tr><td>Inclusion criteria</td><td colspan="5">Children younger than 12 yr. old at the time the family enrolled
Had active asthma (exhibited respiratory symptoms or used asthma medication within the year before enrolment), and
Had lived at the enrolment address for at least 2 months before NO_2 sampling.
If two children in a family met the eligibility criteria, the child with more severe asthma was selected</td></tr>
<tr><td>Exclusion criteria</td><td colspan="5">Not reported</td></tr>
<tr><td>Type of pollutant/exposure</td><td colspan="5">NO_2 from gas stoves, gas dryers</td></tr>
<tr><td>Pollutant/exposure assessment</td><td colspan="5">NO_2 was measured in each home using a Palmes tube placed in the main living area for 10 to 14 d after the enrolment visit.
NO_2 levels were dichotomized as less than 20 ppb versus 20 ppb or more. A concentration of 20 ppb was the median concentration of indoor NO_2 reported for an inner-city population.
Exposure data reported separately for the different sources of NO_2.</td></tr>
<tr><td>Outcome</td><td colspan="5">Respiratory symptoms (exhibited by wheeze, persistent cough, shortness of breath and chest tightness)</td></tr>
<tr><td>Results</td><td colspan="5">Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for household sources of NO_2 related to respiratory symptoms</td></tr>
<tr><td></td><td></td><td>Wheeze</td><td>Persistent cough</td><td>Shortness of breath</td><td>Chest tightness</td></tr>
<tr><td></td><td>Multi-family housing</td><td>OR (95%CI)</td><td>OR (95%CI)</td><td>OR (95%CI)</td><td>OR (95%CI)</td></tr>
<tr><td></td><td>Gas stove</td><td>2.27 (1.15, 4.47)</td><td>1.19 (0.66, 2.16)</td><td>2.38 (1.12, 5.06)</td><td>4.34 (1.76, 10.69)</td></tr>
<tr><td></td><td>Gas dryer</td><td>0.78 (0.23, 2.57)</td><td>1.19 (0.40, 3.53)</td><td>2.39 (0.77, 7.43)</td><td>1.09 (0.31, 3.90)</td></tr>
<tr><td></td><td>NO_2 (per 20 ppb increase)</td><td>1.52 (1.04, 2.21)</td><td>1.06 (0.75, 1.49)</td><td>1.28 (0.85, 1.91)</td><td>1.61 (1.04, 2.49)</td></tr>
<tr><td></td><td>Single-family housing</td><td>OR (95%CI)</td><td>OR (95%CI)</td><td>OR (95%CI)</td><td>OR (95%CI)</td></tr>
<tr><td></td><td>Gas stove</td><td>0.61 (0.35, 1.05)</td><td>0.92 (0.55, 1.51)</td><td>0.91 (0.50, 1.64)</td><td>0.68 (0.34, 1.32)</td></tr>
<tr><td></td><td>Gas dryer</td><td>1.02 (0.50, 2.12)</td><td>0.98 (0.49, 1.94)</td><td>0.93 (0.42, 2.07)</td><td>1.41 (0.61, 3.26)</td></tr>
<tr><td></td><td>NO_2 (per 20 ppb increase)</td><td>0.99 (0.71, 1.38)</td><td>1.07 (0.78, 1.47)</td><td>0.83, 0.52, 1.31)</td><td>1.10 (0.78, 1.57)</td></tr>
<tr><td></td><td colspan="5">Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for each 20-ppb increase in NO_2 measured indoors for household occupant density</td></tr>
</table>

<table>
<tr><th>Bibliographic reference</th><th colspan="5">Belanger K, Gent J F, Triche E W et.al (2006). Association of indoor nitrogen dioxide exposure with respiratory symptoms in children with asthma. American journal of respiratory and critical care medicine, 173(3), pp.297-303</th></tr>
<tr><td rowspan="4"></td><td></td><td>Wheeze</td><td>Persistent cough</td><td>Shortness of breath</td><td>Chest tightness</td></tr>
<tr><td></td><td>OR (95%CI)</td><td>OR (95%CI)</td><td>OR (95%CI)</td><td>OR (95%CI)</td></tr>
<tr><td>Multifamily housing</td><td>1.52 (1.04, 2.21)</td><td>1.06 (0.75, 1.49)</td><td>1.28 (0.85, 1.91)</td><td>1.61 (1.04, 2.49)</td></tr>
<tr><td>Single-family housing</td><td>0.99 (0.71, 1.38)</td><td>1.07 (0.78, 1.47)</td><td>0.83 (0.52, 1.31)</td><td>1.10 (0.78, 1.57)</td></tr>
<tr><td>Follow up</td><td colspan="5">12 months</td></tr>
<tr><td>Risk of bias (Newcastle-Ottawa Scale)</td><td colspan="5">Selection
Representativeness of the exposed cohort
• truly representative of the average child with asthma in the community
Selection of the non-exposed cohort
• drawn from the same community as the exposed cohort
Ascertainment of exposure
• objective sampling
Demonstration that outcome of interest was not present at start of study
• Yes
Comparability
Comparability of cohorts on the basis of the design or analysis
• study controls for age
• study controls for other factors including ethnicity, maintenance medication use, season of sampling and housing characteristics
Outcome
Assessment of outcome
• self-report
Was follow-up long enough for outcomes to occur
• Yes
Adequacy of follow up of cohorts
• complete follow up - all subjects accounted for
Overall level of bias – Moderate (concerns over self-report of outcomes)</td></tr>
<tr><td>Source of funding</td><td colspan="5">Government: The National Institute of Environmental Health Sciences</td></tr>
<tr><td>Comments</td><td colspan="5">Season of sampling classified as warmer months [April–October] or cooler months [November–March]; housing characteristics classified as multi- vs. single-family, number of rooms, water leaks, and visible mould. Use of maintenance medication (inhaled steroid, cromolyn, long-acting β2-agonist, or leukotriene inhibitor during the year before enrolment) was examined as a proxy for asthma severity and provided a reasonable alternative to using respiratory symptoms to classify asthma severity.
• Study suggests an association between indoor NO_2 and increased respiratory symptoms among children with asthma. The NO_2 levels to which participants responded to are common in homes using gas stoves. The levels associated with health effects among the children in multifamily housing are similar to the outdoor annual average exposure of 21 ppb (40 μg/m^3) recommended by the World Health Organization (WHO)</td></tr>
</table>

D.1.6 Belanger 2013

Bibliographic reference	Belanger K, Holford TR, Gent JF et.al (2013). Household levels of nitrogen dioxide and pediatric asthma severity. Epidemiology (Cambridge, and Mass.), 24(2), 320-30.		
Study design	Prospective cohort study		
Objective	To determine the relationship between measured indoor NO_2 and concurrent asthma severity		
Setting/Study location	United states		
Number of participants	1,342 children		
Selected population	Yes – all had asthma		
Participant characteristics	Description	No.	%
	Sex		
	Male	786	59
	Female	556	41
	Age (years)		
	5 – 7	703	52
	8 – 10	639	48
	Race/Ethnicity		
	White	538	40
	African American	260	19
	Hispanic	477	36
	Mixed, Other	67	5
	(Maintenance) medication use		
	No	460	34
	Yes	882	66
	Atopic		
	No	451	34
	Yes	886	66
	Parental education		
	Mother's education (years)		
	< 12	219	16
	12 – 15	729	55
	≥ 16	393	29
	Annual family income	Not reported	
	Building characteristics	Not reported	
Inclusion criteria	Aged between 5 to 10 years Had a caregiver who spoke English Had active asthma defined as two or more of the following: physician diagnosis; asthma symptoms within the past 12 months (wheeze, persistent cough, chest tightness, shortness of breath); use of prescription asthma medication within the past 12 months (short-acting rescue medications and		

Bibliographic reference	**Belanger K, Holford TR, Gent JF et.al (2013). Household levels of nitrogen dioxide and pediatric asthma severity. Epidemiology (Cambridge, and Mass.), 24(2), 320-30.**
	maintenance medications including inhaled steroids, systemic steroids, cromolyn, leukotriene inhibitors) Children who had complete information for health outcome measures and indoor NO_2 monitoring
Exclusion criteria	Not reported
Type of pollutant/exposure	NO_2 from gas stoves
Pollutant/exposure assessment	Palmes tubes to measure NO_2 concentration in rooms where the child spent the most time awake (dayroom) and asleep (bedroom). Quintile NO_2 concentration boundaries (in ppb) were ≤ 4.02, > 4.02 – 6.02, 6.03 – 8.88, 8.89 – 14.32, and > 14.32.
Outcome	Paediatric asthma severity using Global Initiative for Asthmas guidelines Wheeze
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for NO_2 and the risk of increased asthma severity

NO_2 exposure	Asthma severity	Wheeze
	OR (95%CI)	OR (95%CI)
≤ 6.02 (reference)	1.00	1.00
6.02 – ≤ 8.88	1.15 (0.94, 1.42)	1.15 (0.90, 1.45)
8.88 – ≤ 14.30	1.31 (1.04, 1.66)	1.44 (1.11, 1.86)
> 14.30	1.43 (1.08, 1.88)	1.53 (1.16, 2.02)

Follow up	12 months
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average child with asthma in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • secure sampling Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for exposure to smoking in the home • study controls for additional factors as follows age, sex, general atopy, season, specific sensitization, exposure to indoor allergens (Der p 1, Der f 1, Fel d 1, Can f 1), race/ethnicity and mother's education Outcome Assessment of outcome • record linkage Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for

Bibliographic reference	**Belanger K, Holford TR, Gent JF et.al (2013). Household levels of nitrogen dioxide and pediatric asthma severity. Epidemiology (Cambridge, and Mass.), 24(2), 320-30.**
	Overall level of bias – Low
Source of funding	**Government:** NIH National Institutes of Environmental Health Sciences
Comments	Sampling seasons were defined by winter and summer solstice and vernal and autumnal equinox. Study suggests that increase in NO_2 exposure was associated with increased risk in asthma severity. The levels associated with health effects among the children are well below the outdoor annual average exposure of 21 ppb (40 µg/m^3) recommended by the World Health Organization (WHO)

D.1.71 Bertelsen 2010

Bibliographic reference	**Bertelsen R J, Lodrup Carlsen K C. Carlsen K H, et al (2010) Childhood asthma and early life exposure to indoor allergens, endotoxin and beta(1,3)-glucans. Clinical and experimental allergy : journal of the British Society for Allergy and Clinical Immunology 40(2), 307-16**		
Study design	Prospective cohort study		
Objective	To determine if exposure to indoor allergens, b(1,3)-glucans and endotoxin in the homes of the children at 2 years of age modified the risk of asthma, BHR and lung function at 10 years of age.		
Setting/Study location	Norway		
Number of participants	260 children		
Selected population	No		
Participant characteristics	Description	No.	%
	Sex		
	Male	132	50.8
	Female	128	49.2
	Race/Ethnicity	Not reported	
	Parental asthma	34	13.1
	SES reported as parental education		
	University	177	68.0
Inclusion criteria	Not reported		
Exclusion criteria	Not reported		
Type of pollutant/exposure	Allergens		
Pollutant/exposure assessment	The dust sample was collected by the parents according to detailed written instructions. The floor of the living area of the house was vacuumed using a new vacuum cleaner bag, and the collected dust was sent to the Norwegian Institute of Public Health and stored at -20 °C until extraction and analysis.		
Outcome	Asthma		
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs)		
		Asthma	Bronchial hyper-responsiveness
	Cat allergen (per 10 mg increase)	1.20 (1.01, 1.43)	1.22 (1.02, 1.46)

Bibliographic reference	**Bertelsen R J, Lodrup Carlsen K C. Carlsen K H, et al (2010) Childhood asthma and early life exposure to indoor allergens, endotoxin and beta(1,3)-glucans. Clinical and experimental allergy : journal of the British Society for Allergy and Clinical Immunology 40(2), 307-16**
Follow up	8 years
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average child in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • secure sampling Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for alcohol in pregnancy, parental rhinoconjunctivitis at birth and parental education Outcome Assessment of outcome • Clinical diagnosis Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall level of bias – Low**
Source of funding	**Government:** Norwegian Research Council, The Eastern Norway Regional Health Authority, Norwegian Institute of Public Health, The Norwegian Foundation for Health and Rehabilitation, **Academic:** The University of Oslo, Oslo University Hospital, **Professional:** The Norwegian Association for Asthma and Allergy, **Charity:** the Kloster foundation, Voksentoppen BKL, **Industry:** AstraZeneca, Ullev°al Pharmacia and the Hakon group
Comments	

D.1.8 Bhinder 2014

Bibliographic reference	**Bhinder S, Chen H, Sato M, et al (2014) Air pollution and the development of post-transplant chronic lung allograft dysfunction (CLAD). American journal of transplantation : official journal of the American Society of Transplantation and the American Society of Transplant Surgeons 14(12), 2749-57**
Study design	Retrospective cohort study

Bibliographic reference	**Bhinder S, Chen H, Sato M, et al (2014) Air pollution and the development of post-transplant chronic lung allograft dysfunction (CLAD). American journal of transplantation : official journal of the American Society of Transplantation and the American Society of Transplant Surgeons 14(12), 2749-57**		
Objective	To identify relationship between Traffic-related air pollution (TRAP) and outcomes following transplantation in a geographically distinct cohort of lung transplant recipients		
Setting/Study location	Canada		
Number of participants	397 adults		
Selected population	Yes – all had a lung transplant		
Participant characteristics	Description	No.	%
	Recipient age (mean ± SD), years	46±15	-
	Donor age (mean ± SD), years	43±17	-
	Transplant indication		
	COPD	90	23
	Cystic fibrosis	102	26
	Idiopathic pulmonary fibrosis	86	22
	Pulmonary arterial hypertension	19	5
	Bronchiectasis	18	4
	Other	82	21
	Developed CLAD	185	47
	Death	101	25
Inclusion criteria	Not reported		
Exclusion criteria	• Permanent home address outside of Ontario • Inability to geocode permanent home address • Missing demographic data		
Type of pollutant/exposure	Proximity to traffic		
Pollutant/exposure assessment	Authors assessed long-term exposure to traffic-related air pollution (TRAP) using two metrics of distance from major traffic roads: Computed the shortest distances between the patients' residential addresses at the time of transplantation and major traffic roads. Distances were categorized as 0–100, 101–200, 201–1000 and >1000 m. Calculated the total length of major roads that fell within circular buffer regions of a series of radii (200, 300, 500 and 1000 m) from the patients' home addresses		
Outcome	Post-transplant chronic lung allograft dysfunction (CLAD)		
Results	Adjusted hazard ratios (aHRs) and 95% confidence intervals (CIs) for association between proximity to traffic and chronic lung allograft dysfunction (CLAD)		

<table>
<tr><th>Bibliographic reference</th><th colspan="2">Bhinder S, Chen H, Sato M, et al (2014) Air pollution and the development of post-transplant chronic lung allograft dysfunction (CLAD). American journal of transplantation : official journal of the American Society of Transplantation and the American Society of Transplant Surgeons 14(12), 2749-57</th></tr>
<tr><td rowspan="12"></td><td></td><td>CLAD</td></tr>
<tr><td></td><td>aHR (95%CI)</td></tr>
<tr><td colspan="2">Distance to major roads</td></tr>
<tr><td><100m</td><td>1.96 (0.90, 4.29)</td></tr>
<tr><td>101–200m</td><td>1.97 (0.87, 4.47)</td></tr>
<tr><td>201–1000m</td><td>1.72 (0.81, 3.65)</td></tr>
<tr><td>>1000m</td><td>1.00</td></tr>
<tr><td colspan="2">Distance to highways</td></tr>
<tr><td><100m</td><td>4.72 (2.13, 10.47)</td></tr>
<tr><td>101–200m</td><td>2.72 (1.11, 6.65)</td></tr>
<tr><td>201–1000m</td><td>1.05 (0.70, 1.57)</td></tr>
<tr><td>>1000m</td><td>1.00</td></tr>
<tr><td>Follow up</td><td colspan="2">18 years</td></tr>
<tr><td>Study methods</td><td colspan="2">CLAD was defined as an irreversible decline in FEV1 to less than 80% of baseline, measured on two separate occasions at least 3 weeks apart. Irreversibility was determined after appropriate treatment for infection, rejection or both. To control for large-scale spatial patterns in CLAD that might be caused by factors other than pollution, authors created an indicator variable classifying Ontario into southern and northern regions according to the 14 Local Health Integrated Networks of Ontario.
Authors used a stratified Cox proportional hazards model with strata defined as region to determine association between proximity to major road and CLAD adjusting for possible confounders.</td></tr>
<tr><td>Risk of bias (Newcastle-Ottawa Scale)</td><td colspan="2">Selection
Representativeness of the exposed cohort
• somewhat representative of the average population with bilateral lung transplant in the community
Selection of the non-exposed cohort
• no description of the derivation of the non-exposed cohort
Ascertainment of exposure
• validated measurements used
Demonstration that outcome of interest was not present at start of study
• Yes
Comparability
Comparability of cohorts on the basis of the design or analysis
• study controls for age at baseline, sex, pre-transplant diagnosis, age and gender of donor, sex matching between donor and recipient, year of transplantation
Outcome
Assessment of outcome
• Independent assessment with CLAD defined as an irreversible decline in FEV1 to less than 80% of baseline measured on two separate occasions at least 3 weeks apart</td></tr>
</table>

Bibliographic reference	**Bhinder S, Chen H, Sato M, et al (2014) Air pollution and the development of post-transplant chronic lung allograft dysfunction (CLAD). American journal of transplantation : official journal of the American Society of Transplantation and the American Society of Transplant Surgeons 14(12), 2749-57**
	Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias: Moderate** (associations are based a small number of patients)
Source of funding	**Government:** the Canadian Foundation for Innovation and the Ontario Ministry for Research and Innovation
Comments	

D.1.9 Bornehag 2005

Bibliographic reference	**Bornehag CG, Sundell J, Hägerhed-Engman L, et al. (2005) Association between ventilation rates in 390 Swedish homes and allergic symptoms in children. Indoor Air. 15(4):275-80.**
Study design	Nested case control
Objective	To test the hypothesis that a low-ventilation rate in homes is associated with an increased prevalence of asthma and allergic symptoms among children.
Setting/Study location	Varmland, Sweden
Number of dwellings and participants	Number of dwellings: 390 Number of participants: 400 participants (198 symptomatic and 202 non-symptomatic)
Selected population	Yes –cases has respiratory symptoms
Building and Participant characteristics	Building characteristics: Location: unclear Dwelling type: not reported Building age built before 1960, 45.9%; 1961 to 1983, 40.3%; 1984 onwards, 13.9% Type of ownership/tenancy: not reported Type of ventilation: Natural (including kitchen fan), 65.9%; Mechanical exhaust, 23.8%; mechanical exhaust and supply, 10.2% Participant characteristics: Not reported
Inclusion criteria	Cases and controls were selected from children participating in a cohort study. Cases had to have reported at least 2 symptoms of the following symptoms within the last 12 months (at the first follow-up assessment): wheezing without a cold, rhinitis without a cold or eczema Controls had to have reported no symptoms at any follow-up period.

Bibliographic reference	**Bornehag CG, Sundell J, Hägerhed-Engman L, et al. (2005) Association between ventilation rates in 390 Swedish homes and allergic symptoms in children. Indoor Air. 15(4):275-80.**
	All participants would not have built their homes because of moisture problems, changed residence since the first follow-up assessment.
Exclusion criteria	Not reported
Building factor/exposure	Ventilation rate
Building factor/exposure assessment	Ventilation rates were ascertained using a passive tracer path method by professional inspectors during the first week of the cohort study. At follow-up, a questionnaire was sent to parents of all participating children. The questionnaire included questions regarding the child's and parent's health, asthmatic or allergic symptoms, building characteristics, signs of moisture problems and odours.
Outcome	Asthma and allergic symptoms
Results	<table><tr><td>Building characteristic</td><td>Odds ratio (95%CI)</td></tr><tr><td colspan="2">Quartile for ventilation rate</td></tr><tr><td>Third quartile vs. fourth quartile</td><td>1.17 (0.57, 2.42)</td></tr><tr><td>Second quartile vs. fourth quartile</td><td>1.35 (0.66, 2.74)</td></tr><tr><td>First quartile vs. fourth quartile</td><td>1.95 (0.94, 4.04)</td></tr></table>
Follow up	Not reported
Newcastle-Ottawa Scale	Selection Representativeness of the exposed cohort • selected group – children between the age of 1 and 6 from Varmland, Sweden Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • Independently assessed (trained inspectors) Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • Analysis was performed adjusting for sex, smoking in the family, and inspector's observations of moisture-related problems. Outcome Assessment of outcome • Self-reported (by parents of participating children) Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias: Moderate** (Concern over self-report of outcomes)
Source of funding	**Government:** The Swedish Research council for Environment, Agricultural sciences, and Spatial Planning, Swedish Asthma and Allergy Associations Research foundation, and the Swedish Foundation for Health Care Sciences

Bibliographic reference	Bornehag CG, Sundell J, Hägerhed-Engman L, et al. (2005) Association between ventilation rates in 390 Swedish homes and allergic symptoms in children. Indoor Air. 15(4):275-80.
Comments	Cases and controls were selected from participants of a cohort study including children between 1 and 6 years old in the county of Varmland in Sweden.

D.1.10 Bowatte 2017

Bibliographic reference	**Bowatte G, Lodge C J, Knibbs D L et.al (2017) Traffic-related air pollution (TRAP) exposure is associated with allergic sensitisation, asthma, and poor lung function in middle age. J Allergy Clin Immunol 2017;139:122-9**		
Study design	Prospective cohort study		
Objective	To determine whether exposure to Traffic-related air pollution (TRAP) in middle age is associated with current asthma and reduced lung function in adults		
Setting/Study location	Australia		
Number of participants	1405 adults		
Selected population	No		
Participant characteristics	Description	No.	%
	Sex: male	669	49.0
	Maternal age (years)	Not reported	Not reported
	Ethnicity	Not reported	Not reported
	(Maintenance) medication use	Not reported	Not reported
	Atopy	759	55.8
	Parental education (Socioeconomic status)		
	Grade 1-9	90	6.6
	Grade 10-12	525	38.5
	Trade/apprenticeship	489	35.8
	University degree or higher	261	19.1
	Annual family income	Not reported	Not reported
	Building characteristics	Not reported	Not reported
Inclusion criteria	Not reported		
Exclusion criteria	Not reported		
Type of pollutant/exposure	Proximity to major roads (living <200 m from a major road)		
Pollutant/exposure assessment	The distance from participants' residences to the nearest major road was calculated in ArcGIS 10.1 (ArcGIS 10.1, Redlands, Calif: Environmental Systems Research Institute). Major roads were defined as public sector mapping agencies Australia transport hierarchy code 301 and 302 for the		

<table>
<tr><th>Bibliographic reference</th><th colspan="3">Bowatte G, Lodge C J, Knibbs D L et.al (2017) Traffic-related air pollution (TRAP) exposure is associated with allergic sensitisation, asthma, and poor lung function in middle age. J Allergy Clin Immunol 2017;139:122-9</th></tr>
<tr><td></td><td colspan="3">states of Victoria, Tasmania, Queensland, and New South Wales. Major roads included roads carrying ‘‘massive traffic,’’ categorized as freeways, highways, arterial roads, and sub arterial roads. Participants were classified as living in proximity to a major road if their residential address was less than 200 m in straight-line distance from a major road. This cut-off point was chosen on the basis of the known rate of decay observed in levels of major traffic pollutants downwind.</td></tr>
<tr><td>Outcome</td><td colspan="3">Wheeze, asthma</td></tr>
<tr><td rowspan="4">Results</td><td colspan="3">Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between proximity to major roads (living <200 m from a major road) and middle-age wheeze and asthma</td></tr>
<tr><td></td><td>Wheeze</td><td>Asthma</td></tr>
<tr><td></td><td>OR (95%CI)</td><td>OR (95%CI)</td></tr>
<tr><td>Living <200 m from a major road</td><td>1.38 (1.06, 1.80)</td><td>1.21 (0.91, 1.59)</td></tr>
<tr><td>Follow up</td><td colspan="3">Not reported</td></tr>
<tr><td>Study methods</td><td colspan="3">At the laboratory visit, participants underwent lung function tests and skin prick tests for allergens and provided blood samples. In addition to laboratory tests, participants completed a detailed interviewer-administered questionnaire. Associations were assessed using logistic regression models. Socioeconomic status (defined using education), smoking status, gas cooking, gas heating, keeping windows open more than 1 hour per week, and rural or urban status (using Accessibility/Remoteness Index of Australia 2006) were included in the regression models. Associations were examined between the exposure variables, asthma, and wheeze</td></tr>
<tr><td>Risk of bias (Newcastle-Ottawa Scale)</td><td colspan="3">Selection
Representativeness of the exposed cohort
• truly representative of the average population in the community
Selection of the non-exposed cohort
• no description of the derivation of the non-exposed cohort
Ascertainment of exposure
• validated measurements used
Demonstration that outcome of interest was not present at start of study
• Yes
Comparability
Comparability of cohorts on the basis of the design or analysis
• study controls for socioeconomic status, smoking status, rural/urban location, gas cooking, gas heating, and open windows
Outcome
Assessment of outcome
• using positive control and a standard technique
• spirometry was conducted according to the joint American Thoracic Society and European Respiratory Society guidelines
Was follow-up long enough for outcomes to occur
• Yes</td></tr>
</table>

Bibliographic reference	**Bowatte G, Lodge C J, Knibbs D L et.al (2017) Traffic-related air pollution (TRAP) exposure is associated with allergic sensitisation, asthma, and poor lung function in middle age. J Allergy Clin Immunol 2017;139:122-9**
	Adequacy of follow up of cohorts • Follow up not reported **Overall risk of bias: Low**
Source of funding	**Government:** Supported by the Centre for Air Quality and Health Research and Evaluation (CAR), a National Health &Medical Research Council Centre of Research Excellence, Australia.
Comments	

D.1.111 Brunekreef 1989

Bibliographic reference	**Brunekreef B, Dockery DW, Speizer FE, et al (1989) Home dampness and respiratory morbidity in children. The American review of respiratory disease 140(5), 1363-7**		
Study design	Prospective cohort study		
Objective	To explore the relationship between moisture in the home and respiratory symptoms		
Setting/Study location	United States		
Number of participants	4625 children		
Selected population	No		
Participant characteristics	Description	No. (%)	
	Sex	Not reported	
	Age	7 – 11 years	
	Ethnicity White	 4625 (100%)	
	Maternal asthma and/or atopic	Not reported	
	Parental education	Not reported	
	Annual family income	Not reported	
	Building characteristics	Not reported	
Inclusion criteria	Not reported		
Exclusion criteria	Not reported		
Type of pollutant/exposure	Dampness and mould		
Pollutant/exposure assessment	Questionnaire and sampling of air quality (including humidity) done in a random sample of houses		
Outcome	aOR (95%CI) for Respiratory symptoms		
Results		Mould	Dampness
	Wheeze	1.79 (1.44, 2.32)	1.23 (1.10, 1.39)
	Cough	2.12 (1.64, 2.73)	2.16 (1.64, 2.84)
	Bronchitis	1.48 (1.17, 1.87)	1.32 (1.05, 1.67)
	Chest illness	1.40 (1.11, 1.78)	1.52 (1.20, 1.93)

Bibliographic reference	Brunekreef B, Dockery DW, Speizer FE, et al (1989) Home dampness and respiratory morbidity in children. The American review of respiratory disease 140(5), 1363-7		
	Lower respiratory illness Asthma Hay fever Non-chest illness	1.57 (1.31, 1.87) 1.27 (0.93, 1.74) 1.57 (1.31, 1.74) 1.40 (1.13, 1.74)	1.68 (1.41, 2.01) 1.42 (1.04, 1.94) 1.55 (1.25, 1.93) 1.55 (1.25, 1.93)
Follow up	12 months		
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • somewhat representative of the average child in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • questionnaire Demonstration that outcome of interest was not present at start of study • No Comparability Comparability of cohorts on the basis of the design or analysis • study controls for maternal smoking • study controls for additional factors as follows – gender, age, height, weight, city of residence and parental education Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall level of bias – High** (concerns over self-report of exposure and outcomes)		
Source of funding	**Government:** National Institute of Environmental Health Sciences and Environmental Protection Agency **Industry:** Electric Power Research Institute		
Comments			

D.1.12 Cable 2014

Bibliographic reference	Cable N, Kelly Y, Bartley M et.al (2014). Critical role of smoking and household dampness during childhood for adult phlegm and cough: a research example from a prospective cohort study in Great Britain. BMJ open, 4(4), pp.e004807.
Study design	Prospective cohort study
Objective	To examine independent associations between childhood exposures to smoking and household dampness, and phlegm and cough in adulthood
Setting/Study location	United Kingdom

Bibliographic reference	**Cable N, Kelly Y, Bartley M et.al (2014). Critical role of smoking and household dampness during childhood for adult phlegm and cough: a research example from a prospective cohort study in Great Britain. BMJ open, 4(4), pp.e004807.**						
Number of participants	7320 of the British cohort who were born during 1 week in 1970 and had complete data for childhood and adult information						
Selected population	No						
Participants characteristics		Phlegm (n=214)		Cough (n=675)		Phlegm + cough (639)	
		No.	%	No.	%	No.	%
	Sex						
	Male	145	67.76	308	45.63	408	63.85
	Female	69	32.24	367	54.37	231	36.15
	Age	Not reported		Not reported		Not reported	
	Ethnicity	Not reported		Not reported		Not reported	
	(Maintenance) medication use	Not reported		Not reported		Not reported	
	Parental asthma and/or atopic	Not reported		Not reported		Not reported	
	Building characteristics						
	Household dampness at age 10						
	No dampness	178	83.18	568	84.15	488	76.37
	Slight to moderate	25	11.68	84	12.40	108	16.91
	Marked	11	5.14	23	3.41	41	6.73
	Phlegm at age 10						
	Present	12	5.61	27	4.00	28	4.38
	Cough at age 10						
	Present	31	14.49	97	14.37	104	16.28
	Respiratory difficulties at birth						
	Present	6	2.34	15	2.22	14	2.19
	Social position of origin						
	Professional and managerial	44	20.56	99	14.67	88	13.77
	Skilled non-manual	24	11.21	88	13.04	66	10.33
	Skilled manual	92	42.99	317	46.96	309	48.36

<table>
<tr><th>Bibliographic reference</th><th colspan="7">Cable N, Kelly Y, Bartley M et.al (2014). Critical role of smoking and household dampness during childhood for adult phlegm and cough: a research example from a prospective cohort study in Great Britain. BMJ open, 4(4), pp.e004807.</th></tr>
<tr><td></td><td>Non-skilled manual + no male head</td><td>54</td><td>25.23</td><td>171</td><td>25.3 3</td><td>176</td><td>27.54</td></tr>
<tr><td>Inclusion criteria</td><td colspan="7">British Cohort Study (BCS70) of British residents who were born during 1 week in 1970; data have been collected regularly across their life course</td></tr>
<tr><td>Exclusion criteria</td><td colspan="7">Not reported</td></tr>
<tr><td>Type of pollutant/exposure</td><td colspan="7">Dampness exposure at age 10</td></tr>
<tr><td>Pollutant/exposure assessment</td><td colspan="7">The degree of household dampness was addressed via parental interview, asking them to rate the present state of household dampness as: none, slight, moderate or marked. Only a few people responded that their house was ‘moderately’ damp; therefore, this response was included in the category of ‘slight’ dampness</td></tr>
<tr><td>Outcome</td><td colspan="7">Adjusted relative risk ratios (aRRRs) and 95% confidence intervals (CIs phlegm and coughing over the previous 3 months for</td></tr>
<tr><td rowspan="3">Results</td><td></td><td colspan="2">Phlegm only</td><td colspan="2">Cough only</td><td colspan="2">Phlegm + cough</td></tr>
<tr><td>Slight to moderate dampness</td><td colspan="2">0.82 (0.54, 1.27)</td><td colspan="2">0.85 (0.67, 1.09)</td><td colspan="2">1.24 (0.99, 1.56)</td></tr>
<tr><td>Marked dampness</td><td colspan="2">2.05 (1.07, 3.91)</td><td colspan="2">1.26 (0.80,1.99)</td><td colspan="2">2.73 (1.88, 3.99)</td></tr>
<tr><td>Follow up</td><td colspan="7">Not reported</td></tr>
<tr><td>Risk of bias (Newcastle-Ottawa Scale)</td><td colspan="7">Selection
Representativeness of the exposed cohort
• truly representative of the average child and young person in the community
Selection of the non-exposed cohort
• drawn from the same community as the exposed cohort
Ascertainment of exposure
• self-report (questionnaire)
Demonstration that outcome of interest was not present at start of study
• Yes
Comparability
Comparability of cohorts on the basis of the design or analysis
• study controls for childhood phlegm and cough
• study controls for additional factors as follows – age, gender and respiratory difficulties at birth
Outcome
Assessment of outcome
• self-report
Was follow-up long enough for outcomes to occur
• Yes
Adequacy of follow up of cohorts
• complete follow up - all subjects accounted for</td></tr>
</table>

Bibliographic reference	**Cable N, Kelly Y, Bartley M et.al (2014). Critical role of smoking and household dampness during childhood for adult phlegm and cough: a research example from a prospective cohort study in Great Britain. BMJ open, 4(4), pp.e004807.**
	Overall level of bias – High (concerns over self-report of exposure and outcome)
Source of funding	**Government:** Study funded through the UK Economic and Social Research Council's International Centre for Life Course Studies in Society and Health (ES/J019119/1)
Comments	Association between household dampness and co-occurring phlegm and cough suggest long-term detrimental effects of childhood environmental exposures The outcome variable, i.e. patterns of two respiratory symptoms (phlegm and cough), was derived from a well-established questionnaire and not indicative of a particular respiratory disease or lung function.

D.1.13 Carlsten 2010

Bibliographic reference	**Carlsten C, Dimich-Ward H, et al (2010) Indoor allergen exposure, sensitization, and development of asthma in a high-risk birth cohort. Pediatric allergy and immunology : official publication of the European Society of Pediatric Allergy and Immunology 21(4 Pt 2), e740-746**	
Study design	Prospective cohort study	
Objective	To determine how early and current exposures to house dust mites, household cats or dogs, and their respective allergens predict the development of specific sensitization and asthma at the age of 7 yr in this high-risk birth cohort	
Setting/Study location	Canada	
Number of participants	380 children	
Selected population	Yes – infants at risk of asthma	
Participant characteristics	Description	
	No.	
	Sex	Not reported
	Age (years)	Not reported
	Ethnicity	Not reported
	Education	Not reported
	Annual family income	Not reported
	Building characteristics	Not reported
Inclusion criteria	At least one-first degree relative with asthma or 2 first degree relatives with other IgE-mediated allergic diseases (atopic dermatitis, seasonal or perennial allergic rhinitis, or food allergy).	
Exclusion criteria	Not reported	
Type of pollutant/exposure	House dust mite (HDM), cat allergen dog allergen	

<table>
<tr><th>Bibliographic reference</th><th colspan="2">Carlsten C, Dimich-Ward H, et al (2010) Indoor allergen exposure, sensitization, and development of asthma in a high-risk birth cohort. Pediatric allergy and immunology : official publication of the European Society of Pediatric Allergy and Immunology 21(4 Pt 2), e740-746</th></tr>
<tr><td>Pollutant/exposure assessment</td><td colspan="2">Dust samples were collected in households at intervals over year 1 (at 2 wk, 4, 8 and 12 months) and at age 7 using a standard protocol from the following sites: the floor and mattress of the child’s bedroom (and of the parents in year 1), the floor of the most commonly used room, and the upholstered furniture in that room</td></tr>
<tr><td>Outcome</td><td colspan="2">Asthma</td></tr>
<tr><td rowspan="6">Results</td><td colspan="2">Adjusted odds ratios (aORs) and 95% confidence intervals (CIs)</td></tr>
<tr><td></td><td>Asthma</td></tr>
<tr><td></td><td>aOR (95%CI)</td></tr>
<tr><td>HDM</td><td>4.81 (2.47, 9.34)</td></tr>
<tr><td>Cat allergen</td><td>3.33 (1.72, 6.45)</td></tr>
<tr><td>Dog allergen</td><td>3.84 (1.79, 8.22)</td></tr>
<tr><td>Follow up</td><td colspan="2">7 years</td></tr>
<tr><td>Risk of bias (Newcastle-Ottawa Scale)</td><td colspan="2">Selection
Representativeness of the exposed cohort
• selected group of children at risk of asthma
Selection of the non-exposed cohort
• drawn from the same community as the exposed cohort
Ascertainment of exposure
• Objective samples
Demonstration that outcome of interest was not present at start of study
• Yes
Comparability
Comparability of cohorts on the basis of the design or analysis
• study controls for maternal and paternal history of asthma
• study controls for any additional factors - gender, race, maternal education, and city of residence and exposure variables in year 1 including daycare attendance, mother smoking, exclusive breast feeding for ‡4 months, positive PCR for respiratory viruses any time,
Outcome
Assessment of outcome
• independent blind assessment
Was follow-up long enough for outcomes to occur
• Yes
Adequacy of follow up of cohorts
• complete follow up - all subjects accounted for
Overall risk of bias: Low</td></tr>
<tr><td>Source of funding</td><td colspan="2">Government: Canadian Institutes of Health Research, the British Columbia Lung Association, and the Manitoba Medical Service Foundation.</td></tr>
<tr><td>Comments</td><td colspan="2"></td></tr>
</table>

D.1.141 Casas 2012

Bibliographic reference	**Casas L, Tischer C, Tiesler C et.al (2012). Association of gas cooking with children's respiratory health: results from GINIplus and LISAplus birth cohort studies. Indoor air, 22(6), pp.476-82.**		
Study design	Prospective cohort study		
Objective	To examine the effects of long-term exposure to gas cooking on the onset of asthma and respiratory symptoms		
Setting/Study location	Germany		
Number of participants	5078 children from birth up to the age of 10 years		
Selected population	No		
Participant characteristics	Description	No.	%
	Sex		
	Male	2590	51
	Female	2488	49
	Age (years)	Not reported	Not reported
	Ethnicity	Not reported	Not reported
	(Maintenance) medication use	Not reported	Not reported
	Parental asthma and/or atopic		
	Never	1423	28
	Ever	3457	68
	Parental education		
	Low	303	6
	Medium	1314	25.9
	High	3236	63.7
	Annual family income	Not reported	
	Building characteristics	Not reported	
Inclusion criteria	Not reported		
Exclusion criteria	Neonates displaying at least one of the following criteria were excluded: Preterm new-borns (< 37 gestational weeks) Low birth weight (< 2500g) Congenital malformation Symptomatic neonatal infection On antibiotic medication Hospitalisation or intensive medical care during neonatal period New-borns from women with immune-related diseases, on long term medication or who suffered from drug and/or alcohol abuse New-borns from parents with nationalities other than German or who were not born in Germany		
Type of pollutant/exposure	Dampness Pet dander NO_2 from gas cooking		

<table>
<tr><th>Bibliographic reference</th><th colspan="3">Casas L, Tischer C, Tiesler C et.al (2012). Association of gas cooking with children's respiratory health: results from GINIplus and LISAplus birth cohort studies. Indoor air, 22(6), pp.476-82.</th></tr>
<tr><td>Pollutant/exposure assessment</td><td colspan="3">Information on pollutant exposure was taken from questionnaires administered to the parents from birth until the child was 10 years old.</td></tr>
<tr><td>Outcome</td><td colspan="3">Asthma
Persistent wheeze: wheezing episodes before 3 years of age and between 3 and 10 years of age</td></tr>
<tr><td rowspan="6">Results</td><td colspan="3">Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for asthma and persistent wheezing</td></tr>
<tr><td></td><td>Asthma</td><td>Persistent wheeze</td></tr>
<tr><td></td><td>OR (95%CI)</td><td>OR (95%CI)</td></tr>
<tr><td>NO_2 from gas cooking</td><td>1.33 (0.88, 2.00)</td><td>1.09 (0.76, 1.57)</td></tr>
<tr><td>Dampness (ever)</td><td>1.16 (0.87, 1.53)</td><td>1.11 (0.87, 1.43)</td></tr>
<tr><td>Pets at home (ever)</td><td>0.69 (0.52, 0.91)</td><td>1.05 (0.83, 1.33)</td></tr>
<tr><td>Follow up</td><td colspan="3">From birth to the age of 10 years</td></tr>
<tr><td>Risk of bias (Newcastle-Ottawa Scale)</td><td colspan="3">Selection
Representativeness of the exposed cohort
• truly representative of the average child in the community
Selection of the non-exposed cohort
• drawn from the same community as the exposed cohort
Ascertainment of exposure
• interview □
Demonstration that outcome of interest was not present at start of study
• Yes
Comparability
Comparability of cohorts on the basis of the design or analysis
• study controls for parental atopy
• study controls for other factors as follows - Sex, exclusive breastfeeding during the first 4 months of life, day care centre attendance in the first 2 years, pets, dampness and mould, parental education and maternal smoking
Outcome
Assessment of outcome
• self-report
Was follow-up long enough for outcomes to occur
• Yes
Adequacy of follow up of cohorts
• complete follow up - all subjects accounted for □
Overall level of bias – High (concerns over self-report of exposure and outcomes)</td></tr>
<tr><td>Source of funding</td><td colspan="3">Not reported</td></tr>
<tr><td>Comments</td><td colspan="3">None</td></tr>
</table>

D.1.15 Casas 2013

Bibliographic reference	**Casas L, Zock JP, Carsin AE, et al (2013) The use of household cleaning products during pregnancy and lower respiratory tract infections and wheezing during early life. International journal of public health 58(5), 757-64**		
Study design	Prospective cohort study		
Objective	To evaluate the effects of household use of cleaning products during pregnancy on respiratory symptoms and airway infections during the first year of life		
Setting/Study location	Spain		
Number of participants	2,292 children		
Selected population	No		
Participant characteristics	Description		
	Sex		
	Boys	51.7%	
	Age	1 year	
	Ethnicity	Not reported	
	Education (reported as maternal)		
	Primary education or below	23.2%	
	Secondary education	41.5%	
	University education or more	35.3%	
	SES	Not reported	
	Building characteristics	Not reported	
Inclusion criteria	First trimester of pregnancy age ≥16 years Intention to deliver at the reference hospital Singleton pregnancy Ability to communicate in Spanish		
Exclusion criteria	Not reported		
Type of pollutant/exposure	Domestic cleaning products such as bleach, ammonia, solvents, furniture polishes, glass cleaners, air fresheners, multiuse cleaners, ironing sprays, floor cleaning sprays, oven sprays and carpet sprays		
Pollutant/exposure assessment	Interview		
Outcome	Wheeze Lower respiratory tract infection		
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between cleaning product use, lower respiratory infection (LRTI) and wheezing.		
		LRTI	Wheezing
	Use during pregnancy	aOR (95%CI)	aOR (95%CI)
	Categories of products (all cohorts)		
	Furniture polishes, glass cleaners and air fresheners	0.97 (0.75, 1.24)	0.93 (0.73, 1.92)
	Spray and solvents	1.54 (1.11, 2.14)	1.68 (1.21, 2.35)

Bibliographic reference	**Casas L, Zock JP, Carsin AE, et al (2013) The use of household cleaning products during pregnancy and lower respiratory tract infections and wheezing during early life. International journal of public health 58(5), 757-64**		
	Bleach and ammonia	0.99 (0.62, 1.57)	1.01 (0.78, 1.30)
	Individual products (all cohorts)		
	Bleach	0.91 (0.71–1.17)	0.91 (0.72–1.17)
	Ammonia	1.03 (0.82–1.29)	1.00 (0.80–1.26)
	Solvents	1.19 (0.95–1.48)	1.30 (1.03–1.62)
	Furniture polishes	0.99 (0.81–1.22)	1.01 (0.82–1.24)
	Glass cleaners	0.92 (0.72–1.18)	0.94 (0.74–1.20)
	Air fresheners	1.29 (1.03–1.63)	1.09 (0.87–1.37)
	Multiuse cleaners	0.92 (0.74–1.15)	0.91 (0.73–1.13)
	Degreasing products	1.23 (0.90–1.69)	1.32 (0.97–1.79)
	Sprays	1.29 (1.04–1.59)	1.37 (1.10–1.69)
	Timing of use (2 cohorts only n=1157)		
	Spray during pregnancy only	1.19 (0.82–1.73)	1.62 (1.11–2.36)
	Spray after pregnancy only	0.90 (0.53–1.55)	1.34 (0.80–2.24)
	Spray during and after pregnancy	1.43 (0.97–2.13)	1.61 (1.08–2.41)
	Solvents during pregnancy only	0.94 (0.65–1.38)	1.04 (0.71–1.51)
	Solvents after pregnancy only	1.06 (0.67–1.66)	0.87 (0.55–1.37)
	Solvents during and after pregnancy	1.35 (0.73–2.50)	1.81 (0.98–3.37)
	Air fresheners during pregnancy only	1.31 (0.77–2.21)	1.39 (0.85–2.29)
	Air fresheners after pregnancy only	1.85 (1.04–3.30)	1.75 (1.01–3.04)
	Air fresheners during and after pregnancy	1.59 (1.00–2.55)	1.23 (0.79–1.93)
Follow up	1 year		
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average pregnant woman in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • structured interview Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for maternal smoking history • study controls for additional factors - sex, month of birth, parity, breast feeding, day care attendance, maternal age, country of origin of the mother, maternal education, maternal asthma and maternal atopy.) Outcome Assessment of outcome • self-report (maternal)		

Bibliographic reference	**Casas L, Zock JP, Carsin AE, et al (2013) The use of household cleaning products during pregnancy and lower respiratory tract infections and wheezing during early life. International journal of public health 58(5), 757-64**
	Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias: Moderate** (concerns over self-report of outcomes)
Source of funding	**Government:** Instituto de Salud Carlos III, the Conselleria de Sanitat Generalitat Valenciana, the Spanish Ministry of Health, the Generalitat de Catalunya, Obra Social Cajastur, Universidad de Oviedo, Department of Health of the Basque Government, Provincial Government of Gipuzkoa, and Fundacio´n Roger Torne
Comments	

D.1.16 Casas 2015

Bibliographic reference	**Casas L, Sunyer J, Tischer C, et al (2015) Early-life house dust mite allergens, childhood mite sensitization, and respiratory outcomes. Allergy 70(7), 820-7**		
Study design	Prospective cohort study		
Objective	To evaluate the associations of early-life HDM allergen concentrations in indoor dust with respiratory symptoms, and asthma from birth to school age		
Setting/Study location	Spain, Germany, Sweden, the Netherlands		
Number of participants	4334		
Selected population	No		
Participant characteristics	Description	No.	%
	Sex		
	Male	Not reported	Not reported
	Female	2094	48.3
	Age (years)	Not reported	Not reported
	Ethnicity	Not reported	Not reported
	Parental education High Medium Low	 2331 1279 660	 53.8 29.5 15.2
	Paternal asthma / allergic rhinitis	2076	47.9
Inclusion criteria	Children with measured HDM allergen levels (Dermatophagoides pteronyssinus (Der p1) or Dermatophagoides farina (Der f1)) in home dust		

Bibliographic reference	**Casas L, Sunyer J, Tischer C, et al (2015) Early-life house dust mite allergens, childhood mite sensitization, and respiratory outcomes. Allergy 70(7), 820-7**		
	samples collected during early life, and with follow-ups until age 8 years (PIAMA-NHS and BAMSE) or 10 years (INMA-Menorca, LISAplus, and MAS).		
Exclusion criteria	Not reported		
Type of pollutant/exposure	House dust mite		
Pollutant/exposure assessment	Bedroom dust samples were collected using vacuum cleaners equipped with ALK filter holders containing paper filters on the child’s mattress (INMA-Menorca, LISAplus, and PIAMA-NHS), bedroom floor (MAS) or parents’ mattress (BAMSE), stored at 20°C for up to 6 years,		
Outcome	Asthma, wheeze:		
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs)		
	HDM allergen	Der p1	Der f1
	Persistent wheezing <Low ≥Low to <0.4 μg/g 0.4 to <2 μg/g ≥2 μg/g	 Reference 1.1 (0.7–1.8) 0.9 (0.7–1.3) 0.8 (0.5–1.1)	 Reference 1.2 (0.8–1.8) 1.1 (0.8–1.5) 1.1 (0.8–1.6)
	Asthma ≤ 6 years <Low ≥Low to <0.4 μg/g 0.4 to <2 μg/g ≥2 μg/g	 Reference 1.4 (0.9–2.3) 1.1 (0.8–1.6) 1.0 (0.7–1.5)	 Reference 1.2 (0.8–1.8) 1.2 (0.8–1.6) 1.2 (0.8–1.8)
	Asthma > 6 years <Low ≥Low to <0.4 μg/g 0.4 to <2 μg/g ≥2 μg/g	 Reference 1.1 (0.6–1.8) 1.1 (0.8–1.6) 0.7 (0.4–1.0)	 Reference 1.0 (0.7–1.6) 1.0 (0.7–1.4) 1.1 (0.7–1.6)
Follow up	From birth to the age of 10 years		
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average child in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • Objective assessment Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for sex, no. of siblings at birth, parental education, maternal smoking during pregnancy, and parental asthma or atopy. Outcome Assessment of outcome • Clinical diagnosis		

Bibliographic reference	**Casas L, Sunyer J, Tischer C, et al (2015) Early-life house dust mite allergens, childhood mite sensitization, and respiratory outcomes. Allergy 70(7), 820-7**
	Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall level of bias – Low**
Source of funding	Not reported
Comments	None

D.1.17 Chang 2009

Bibliographic reference	**Chang J, Delfino R J, Gillen D, et al (2009) Repeated respiratory hospital encounters among children with asthma and residential proximity to traffic. Occupational and environmental medicine 66(2), 90-8**				
Study design	Retrospective cohort study				
Objective	To examine the association between neighbourhood traffic burden and repeated acute respiratory illnesses that required emergency department visits and/or hospitalisation for children with a primary or secondary diagnosis of asthma				
Setting/Study location	United States				
Number of participants	3297 children				
Selected population	Yes – all had asthma				
Participant characteristics	Description	Readmission			
		No.	%	No.	%
	Sex				
	male	1410	56.85	490	59.98
	Female	1070	43.15	327	40.02
	Ethnicity				
	White non-Hispanic	1072	43.23	392	47.98
	White Hispanic	1087	43.83	360	44.06
	Black	66	2.66	17	2.08
	Asian	69	2.78	18	2.20
	Other	124	5.00	21	2.57
	Unknown	62	2.50	9	1.10
	Maternal age (years)	Not reported		Not reported	
	(Maintenance) medication use	Not reported		Not reported	
	Maternal asthma and/or atopic	Not reported		Not reported	
	Parental education	Not reported		Not reported	

Bibliographic reference	**Chang J, Delfino R J, Gillen D, et al (2009) Repeated respiratory hospital encounters among children with asthma and residential proximity to traffic. Occupational and environmental medicine 66(2), 90-8**				
	Median household (family) income				
	≤$29 999	180	7.26	64	7.83
	$30 000–$39 999	687	27.7	226	27.66
	$40 000–$49 999	586	23.63	203	24.85
	$50 000–$59 999	441	17.78	150	18.36
	$60 000 +	586	23.63	174	21.30
	Building characteristics	Not reported		Not reported	
Inclusion criteria	Aged 18 years or younger One or more respiratory hospital encounters for a primary or secondary diagnosis of asthma (ICD-9 493) within the study period Home residence in census block areas located within 13 km of either UCIMC or CHOC (catchment area).				
Exclusion criteria	Not reported				
Type of pollutant/exposure	Neighbourhood traffic exposure				
Pollutant/exposure assessment	EZ-Locate (Tele Atlas North America Inc, Boston, MA, USA) was used to geocode residential addresses reported at the first hospital encounter. ArcView GIS was used to calculate three traffic proxies reflecting local traffic-related air pollution exposure levels. For the first traffic metric, authors calculated the shortest distance from each child's primary residence to the nearest major road (arterial road or freeway). Thereafter, a 300-metre buffer was drawn around each child's residence to reflect an ''exposure zone'' to local traffic-related air pollution. Authors then calculated the total length of major roads within the 300-metre buffer by summing up all arterial road and/or freeway lengths within the 300-metre buffer. Lastly, neighbourhood traffic density was calculated by dividing the total vehicle metres travelled (VMT) within the 300-metre buffer by the area of the buffer				
Outcome	Asthma hospital attendance				
Results	Adjusted hazard ratios (aHRs) and 95% confidence intervals (CIs) for association between residential traffic exposure and repeated hospital encounters for children age 0 to 18 years diagnosed with asthma				
		Repeated hospital encounters			
		aHR (95%CI)			
	Residence distance (metres) to nearest arterial road or freeway				
	< 300	1.00			
	150 – 300	1.21 (1.00, 1.45)			
	50–150	1.14 (0.95, 1.37)			
	< 50	1.11 (0.92, 1.33)			
Follow up	Follow up not reported				
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average child the community Selection of the non-exposed cohort				

Bibliographic reference	Chang J, Delfino R J, Gillen D, et al (2009) Repeated respiratory hospital encounters among children with asthma and residential proximity to traffic. Occupational and environmental medicine 66(2), 90-8
	• no description of the derivation of the non-exposed cohort Ascertainment of exposure • validated measurements used Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for race, age group, gender, insurance status, residence distance to treating hospital and median household income Outcome Assessment of outcome • Hospital encounters for a primary diagnosis of asthma Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • Follow up not reported **Overall risk of bias: Low**
Source of funding	**Government:** South Coast Air Management District (SCAQMD), through the University of California, Los Angeles, Asthma and Outdoor Air Quality Consortium, the National Institute of Environmental Health Sciences (NIEHS) and US National Institutes of Health (NIH)
Comments	

D.1.18 Cho 2006

Bibliographic reference	Cho SH, Reponen T, LeMasters G, et al (2006) Mold damage in homes and wheezing in infants. Annals of Allergy, and Asthma and Immunology 97(4), 539-545	
Study design	Prospective cohort study	
Objective	To examine association of exposure to mould or water damage and HDM with the prevalence of recurrent wheezing in infants at the age of 1 year.	
Setting/Study location	United States	
Number of participants	640 infants	
Selected population	Yes – at risk (due to parental atopy)	
Participant characteristics	Description	No (%)
	Sex	
	Male	354 (55.3%)
	Maternal age (years)	Not reported
	Ethnicity	
	White	519 (81.1%)
	Paternal asthma and/or atopic	640 (100%)
	Parental education	Not reported

Bibliographic reference	**Cho SH, Reponen T, LeMasters G, et al (2006) Mold damage in homes and wheezing in infants. Annals of Allergy, and Asthma and Immunology 97(4), 539-545**	
	Annual family income <$20,000 Building characteristics	 95 (14.8%) Not reported
Inclusion criteria	At least one parent was atopic, defined as having allergic symptoms and a positive reaction on a skin prick test (SPT) to at least 1 of 15 common aeroallergens	
Exclusion criteria	Not reported	
Type of pollutant/exposure	Mould from water damage	
Pollutant/exposure assessment	Home inspection - The families were requested not to clean the floor for at least 1 day before the dust sampling. At the visit, a parent was asked to identify the room where the child spent most of his or her daytime, referred to as the child's primary activity room (PAR). Dust samples were collected from flooring materials in the PAR using a vacuum cleaner (Filter Queen Majestic, HMI Industries Inc, Seven Hills, OH) at a flow rate of 800 L/min. Additionally, in the infant's PAR, the infant's bedroom, and the basement, the existence of mouldy odour was recorded using a checklist, and temperature and relative humidity were measured with a thermohygrometer	
Outcome		
Results	Adjusted odds ratios (aRRs) and 95% confidence intervals (CIs) for association between mould, house dust mite (HDM) and Recurrent wheeze	
		Recurrent wheeze aRRs (95%CI)
	Mould class 1 (minor damage)	1.2 (0.9, 1.7)
	Mould class 2 (major damage)	2.1 (1.2, 3.6)
	HDM > 2 μ g/g	1.1 (0.8, 1.7)
Follow up	4 – 5 months	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • selected group of infants Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • written report (for mould) Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for house dust mite • study controls for additional factor ass follows – mould class and family income Outcome Assessment of outcome • independent blind assessment Was follow-up long enough for outcomes to occur	

Bibliographic reference	Cho SH, Reponen T, LeMasters G, et al (2006) Mold damage in homes and wheezing in infants. Annals of Allergy, and Asthma and Immunology 97(4), 539-545
	• Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall level of bias – Moderate** (concern over self-report of exposure)
Source of funding	**Government:** National Institute of Environmental Health Sciences
Comments	No
Additional references	Reponen T, Lockey J, Bernstein DI, et al (2012) Infant origins of childhood asthma associated with specific moulds. The Journal of allergy and clinical immunology 130(3), 639-644.e5

D.1.19 Clarke 2015

Bibliographic reference	Clarke CA, Reynolds P, Oakley-GI, et al (2015) Indicators of microbial-rich environments and the development of papillary thyroid cancer in the California Teachers Study. Cancer epidemiology 39(4), 548-53	
Study design	Prospective cohort study	
Objective	To investigate the association between early life self-reported exposures to microbial-rich environments and papillary thyroid cancer risk	
Setting/Study location	United States	
Number of participants	61,799 women	
Selected population	No	
Participant characteristics	Description	
	Sex	
	Female	61799 (100%)
	Age (years) – Mean (SD)	62.7 (12.3)6
	Ethnicity	
	White	54,473 (88.1%)
	Non-white	6,913 (11.2%)
	Unknown	413 (0.7%)
	Education	Not reported
	SES	
	Q1, Q2-low SES	12,404 (20.1%)
	Q3	19,821 (32.1%)
	Q4-high SES	28,839 (46.7%)
	Unknown	735 (1.2%)
	Building characteristics	Not reported
Inclusion criteria	Not reported	
Exclusion criteria	Not reported	
Type of pollutant/exposure	Pet ownership	

Bibliographic reference	**Clarke CA, Reynolds P, Oakley-GI, et al (2015) Indicators of microbial-rich environments and the development of papillary thyroid cancer in the California Teachers Study. Cancer epidemiology 39(4), 548-53**	
Pollutant/exposure assessment	Questionnaire	
Outcome	Papillary thyroid cancer	
Results	Adjusted risk ratios (aRRs) and 95% confidence intervals (CIs) for association between pets at home and repeated wheeze	
		Papillary thyroid cancer aRR (95%CI)
	Lived with a cat or dog	0.77 (0.51, 1.17)
Follow up	Not reported	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average woman in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • Questionnaire Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for family history of thyroid cancer • study controls for additional factor as follows - race/ethnicity, family or personal history of BTD, parity, adolescent menstrual cycle length and time to regular cycles, recency of pregnancy, oral contraceptive use, height, alcohol use, smoking history) Outcome Assessment of outcome • record linkage Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • subjects lost to follow up unlikely to introduce bias - or description provided of those lost) **Overall risk of bias – Moderate** (concern over self-report of exposure)	
Source of funding	**Government:** National Cancer Institute.	
Comments		

D.1.20 Cole Johnson 2004

Bibliographic reference	**Cole Johnson C, Ownby DR, Havstad SL, et al (2004) Family history, dust mite exposure in early childhood, and risk for pediatric atopy and asthma. The Journal of allergy and clinical immunology 114(1), 105-10**
Study design	Prospective cohort study

Bibliographic reference	**Cole Johnson C, Ownby DR, Havstad SL, et al (2004) Family history, dust mite exposure in early childhood, and risk for pediatric atopy and asthma. The Journal of allergy and clinical immunology 114(1), 105-10**	
Objective	To investigate the relationship of dust mite allergen exposure during early life to allergic sensitivity and asthma at 6 to 7 years of age.	
Setting/Study location	United States	
Number of participants	428 children	
Selected population	No	
Participant characteristics	Description	
	Sex Male Age (years) Ethnicity White Parental history of allergy, hay fever or asthma Education SES class Building characteristics	 201 (49.1%) Up to 7 years 413 (96.5%) 243 (56.8%) Not reported Not reported Not reported
Inclusion criteria	Children born at term (>36 weeks) without complications	
Exclusion criteria	Not reported	
Type of pollutant/exposure	Allergens	
Pollutant/exposure assessment	Dust samples were obtained by vacuuming a 1-m2 area of floor directly beside the child's bed for 2 minutes and were assayed for Der f 1 and Der p 1 by using monoclonal antibody based assays	
Outcome	Asthma	
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs)	
	dust mite [Der f 1 + Der p 1] exposure at ≤2 years of age ≥2 μg per gram of house dust,	Asthma
	Children without a parental history	1.04 (0.36, 3.04)
	Children with a parental history	1.30 (0.56, 3.03)
	Children with a maternal history	1.73 (0.59, 5.04)
	Children with a paternal history	1.77 (0.55, 5.74)
Follow up	7 years	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average child in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • objective sampling Demonstration that outcome of interest was not present at start of study • Yes Comparability	

Bibliographic reference	**Cole Johnson C, Ownby DR, Havstad SL, et al (2004) Family history, dust mite exposure in early childhood, and risk for pediatric atopy and asthma. The Journal of allergy and clinical immunology 114(1), 105-10**
	Comparability of cohorts on the basis of the design or analysis • study controls for child's sex, first-born status, cord blood IgE, parental education, parental history of allergies and asthma (except where stratified by this variable), and early exposure to household cats or dogs, tobacco smoke, and day-care. Outcome Assessment of outcome • clinical diagnosis Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • subjects lost to follow up unlikely to introduce bias **Overall risk of bias: Low**
Source of funding	**Government:** National Institute of Allergy and Infectious Diseases, National Institute of Environmental Health Sciences. **Charity:** The Fund for Henry Ford Hospital
Comments	

D.1.21 Cullinan 2004

Bibliographic reference	**Cullinan P, MacNeill SJ, Harris JM et al (2004) Early allergen exposure, skin prick responses, and atopic wheeze at age 5 in English children: a cohort study. Thorax 59(10), 855-61**	
Study design	Prospective cohort study	
Objective	To test the null hypothesis that early allergen exposure does not influence the development of either specific IgE sensitisation or of associated asthma	
Setting/Study location	United Kingdom	
Number of participants	552 children	
Selected population	No	
Participant characteristics	Description	
	Sex Age (years) Ethnicity Education SES class I/II III–V Building characteristics	Not reported Up to 8 years Not reported Not reported 146 352 Not reported
Inclusion criteria	Not reported	
Exclusion criteria	Not reported	

Bibliographic reference	**Cullinan P, MacNeill SJ, Harris JM et al (2004) Early allergen exposure, skin prick responses, and atopic wheeze at age 5 in English children: a cohort study. Thorax 59(10), 855-61**	
Type of pollutant/exposure	Dust mite and cat allergen exposure	
Pollutant/exposure assessment	Approximately 8 weeks after birth each baby was visited at home and dust samples were collected from the living room floor. These samples were assayed for concentrations of house dust mite and cat allergen using standard techniques.	
Outcome	Atopic wheeze	
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between dust mite, cat allergen exposure and asthma	
		Atopic wheeze
		aOR (95%CI)
	Der p 1 exposure- µg/g dust median (range)	
	Quintile 1=0.1 ((0.02–0.3)	1.00
	Quintile 2=0.5 (0.3–0.8)	1.35 (0.37, 4.88)
	Quintile 3=1.3 (0.8–2.2)	2.44 (0.75, 7.92)
	Quintile 4=4.3 (2.2–7.9)	1.16 (0.30, 4.48)
	Quintile 5=17.5 (8.0–385.0)	1.71 (0.47, 6.23)
	Fel d 1 exposure - µg/g dust median (range)	
	Quintile 1=0.2 (0.01–0.5)	1.00
	Quintile 2=0.7 (0.5–1.1)	1.14 (0.36, 3.65)
	Quintile 3=1.9 (1.1–3.5)	0.73 (0.21, 2.47)
	Quintile 4=10.1 (3.6–47.8)	0.88 (0.27, 2.86)
	Quintile 5=140.5 (47.8–2799.8	0.51 (0.14, 1.81)
Follow up	5.5 years	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average child in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • objective sampling Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for maternal allergy • study controls for additional factors – paternal atopy, maternal education, crowding index and paternal age Outcome Assessment of outcome • record linkage Was follow-up long enough for outcomes to occur • Yes	

Bibliographic reference	**Cullinan P, MacNeill SJ, Harris JM et al (2004) Early allergen exposure, skin prick responses, and atopic wheeze at age 5 in English children: a cohort study. Thorax 59(10), 855-61**
	Adequacy of follow up of cohorts • subjects lost to follow up unlikely to introduce bias - small number lost – **Overall risk of bias: Low**
Source of funding	**Charity:** Colt Foundation
Comments	

D.1.22 de Bilderling 2005

Bibliographic reference	**de Bilderling G, Chauhan AJ, Jeff's JA et.al (2005). Gas cooking and smoking habits and the risk of childhood and adolescent wheeze. American journal of epidemiology, 162(6), 513-22.**		
Study design	Prospective cohort study		
Objective	To determine whether exposure to indoor pollutant sources in childhood and adolescence was associated with respiratory symptoms		
Setting/Study location	United Kingdom		
Number of participants	1868 children and adolescents		
Selected population	No		
Participant characteristics	Description	No.	%
	Sex	Not reported	Not reported
	Maternal age (years)	Not reported	Not reported
	Ethnicity	Not reported	Not reported
	(Maintenance) medication use	Not reported	Not reported
	Maternal asthma and/or atopic	Not reported	Not reported
	Parental education	Not reported	Not reported
	Annual family income	Not reported	Not reported
	Building characteristics	Not reported	Not reported
Inclusion criteria	Not reported		
Exclusion criteria	Not reported		
Type of pollutant/exposure	NO_2 from gas heating and cooking appliances		
Pollutant/exposure assessment	Questionnaire ascertained data on history of atopic disorders (hay fever and eczema), the presence of smokers in the household, paternal occupation, and current smoking habits (by means of a separate confidential smoking questionnaire sent to each adolescent in a separate reply paid envelope).		

Bibliographic reference	de Bilderling G, Chauhan AJ, Jeff's JA et.al (2005). Gas cooking and smoking habits and the risk of childhood and adolescent wheeze. American journal of epidemiology, 162(6), 513-22.	
	Postal questionnaire in the same cohort to obtain data on cooking, heating, and smoking habits and personal and lifestyle factors contributing to indoor pollution.	
Outcome	Childhood wheezing – reported wheezing (past and/or current) was present at any time up to age 7–8 years but not at any time up to age 15–17 years Adolescent wheezing – no reported wheezing at any time up to age 7–8 years but reported wheezing (past and/or current) at age 15–17 years Persistent wheezing – reported wheezing (past and/or current) was present at any time up to age 7–8 years and at any time up to age 15–17 years	
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between gas cooking, heating sources, childhood wheezing and persistent wheezing	
		Adolescent wheezing
		aOR (95%CI)
	Any gas for cooking	1.02 (0.77, 1.36)
	Gas hob for cooking	0.93 (0.69, 1.26)
	Gas hob + pilot light	1.02 (0.72, 1.42)
	Gas hob + fan	1.16 (0.78, 1.74)
	Gas oven for cooking	0.98 (0.73, 1.33)
	Gas oven + pilot light	0.89 (0.63, 1.24)
	Gas oven + fan	1.39 (0.78, 2.46)
	Gas central heating	0.76 (0.47, 1.23)
	Gas fire for heating	0.97 (0.67, 1.39)
Follow up	7 – 8 years	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average adolescent in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • written self-report Demonstration that outcome of interest was not present at start of study No Comparability Comparability of cohorts on the basis of the design or analysis • study controls for personal atopic status • study controls for other factors as follows, gender and social class.) Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for	

Bibliographic reference	**de Bilderling G, Chauhan AJ, Jeff's JA et.al (2005). Gas cooking and smoking habits and the risk of childhood and adolescent wheeze. American journal of epidemiology, 162(6), 513-22.**
	Overall level of bias – High (concerns over self-report of outcome and presence of outcome at 7-8 years of age),
Source of funding	**Government:** United Kingdom Department for Environment, Food and Rural Affairs; the United Kingdom Department of Health; and the Medical Research Council.
Comments	Only data on persistent wheeze from 1987 exposure used due to lack of information on other data points. Study suggests increased risk in wheezing and exposure to any gas in childhood and reduced risk with the use of electric storage heating also in childhood.

D.1.23 du Prel 2006

Bibliographic reference	**du Prel, X , Kramer U, Behrendt H, et al (2006) Preschool children's health and its association with parental education and individual living conditions in East and West Germany. BMC public health 6, 312**	
Study design	Prospective study	
Objective	To investigate the associations between health indicators, living conditions and parental educational level as indicator of the social status of 6-year-old children	
Setting/Study location	Germany	
Number of participants	28888 children	
Selected population	No	
Participant characteristics	Individual characteristics	
	Age - Median (Range)	6.3 years (5.6 to 7.1)
	Sex female	49.2%.
	Race / ethnicity	Not reported
	SES	Not reported
Inclusion criteria	All children born in geographically defined areas	
Exclusion criteria	Not reported	
Type of pollutant / exposure	Damp housing condition Unfavourable indoor air (defined as oven heated with fossil fuel or cooking with gas)	
Pollutant / exposure assessment	Questionnaire	
Outcome	Adjusted odds ratio (95% confidence interval)	

Bibliographic reference	**du Prel, X , Kramer U, Behrendt H, et al (2006) Preschool children's health and its association with parental education and individual living conditions in East and West Germany. BMC public health 6, 312**	
Results	Unfavourable indoor air (East Germany)	
	Overweight, BMI > 19 kg/m2	0.89 (0.78, 1.01)
	Bronchitis, ever diagnosed	1.02 (0.96, 1.09)
	More than 4 colds in the last 12 months	1.13 (1.03, 1.23)
	Frequent cough	0.97 (0.86, 1.10)
	Sneeze attacks in the last 12 months	0.92 (0.80, 1.06)
	Allergy, ever diagnosed	1.07 (0.96, 1.18)
	Eczema, ever diagnosed	0.90 (0.83, 0.98)
	Damp housing conditions (East Germany)	
	Overweight, BMI > 19 kg/m2	0.87 (0.70, 1.08)
	Bronchitis, ever diagnosed	1.25 (1.13, 1.37)
	More than 4 colds in the last 12 months	1.41 (1.25, 1.60)
	Frequent cough	1.66 (1.42, 1.95)
	Sneeze attacks in the last 12 months	1.52 (1.26, 1.83)
	Allergy, ever diagnosed	1.09 (0.93, 1.28)
	Eczema, ever diagnosed	1.15 (1.01, 1.31)
	Unfavourable indoor air (West Germany)	
	Overweight, BMI > 19 kg/m2	1.12 (0.86, 1.47)
	Bronchitis, ever diagnosed	1.15 (1.00, 1.32)
	More than 4 colds in the last 12 months	0.96 (0.79, 1.18)
	Frequent cough	0.88 (0.68, 1.15)
	Sneeze attacks in the last 12 months	1.21 (0.88, 1.66)
	Allergy, ever diagnosed	0.97 (0.79, 1.19)
	Eczema, ever diagnosed	1.07 (0.87, 1.32)
	Damp housing conditions (West Germany)	
	Overweight, BMI > 19 kg/m2	1.26 (0.85, 1.86)
	Bronchitis, ever diagnosed	1.30 (1.03, 1.65)
	More than 4 colds in the last 12 months	1.62 (1.21, 2.17)
	Frequent cough	2.60 (1.90, 3.55)
	Sneeze attacks in the last 12 months	2.25 (1.52, 3.33)
	Allergy, ever diagnosed	1.20 (0.87, 1.66)
	Eczema, ever diagnosed	1.10 (0.77, 1.57)
Follow up	6 years	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average child in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort	

Bibliographic reference	**du Prel, X , Kramer U, Behrendt H, et al (2006) Preschool children's health and its association with parental education and individual living conditions in East and West Germany. BMC public health 6, 312**
	Ascertainment of exposure • structured interview Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for living conditions • study controls for additional factor – age, gender, location and parental education Outcome Assessment of outcome • independent assessment Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for • subjects lost to follow up unlikely to introduce bias - or description provided of those lost) **Overall risk of bias: Low**
Source of funding	**Government:** Ministries of Environment of North Rhine-Westphalia and Saxony-Anhalt
Comments	

D.1.24 Dales 1991

Bibliographic reference	**Dales R E, Burnett R, and Zwanenburg H (1991) Adverse health effects among adults exposed to home dampness and moulds. The American review of respiratory disease 143(3), 505-9**	
Study design	Retrospective cohort study	
Objective	To examine the relationship between dampness and symptoms	
Setting/Study location	Canada	
Number of participants	14,799 adults	
Selected population	No	
Participant characteristics	Description	
	Sex	
	Female	11472 (83.2%)
	Age (years)	33.4 (SD 5.2) years
	Ethnicity	

Bibliographic reference	**Dales R E, Burnett R, and Zwanenburg H (1991) Adverse health effects among adults exposed to home dampness and moulds. The American review of respiratory disease 143(3), 505-9**	
	White Education Some post / secondary Other Annual family income	13430 (97.4%) 5676 (41.2%) 6132 (44.5%) Not reported
Inclusion criteria	Not reported	
Exclusion criteria	Not reported	
Type of pollutant/exposure	Dampness and mould	
Pollutant/exposure assessment	Questionnaire	
Outcome	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for respiratory symptoms and eye irritation	
Results	 Upper respiratory symptoms Lower respiratory symptoms Chronic respiratory disease Asthma Eye irritation	aOR (95%CI) 1.50 (1.38, 1.61) 1.62 (1.48, 1.78) 1.45 (1.29, 1.64) 1.56 (1.25, 1.95) 1.63 (1.46, 1.82)
Follow up	12 months	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average adult Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • written self-report Demonstration that outcome of interest was not present at start of study • No Comparability Comparability of cohorts on the basis of the design or analysis • study controls for smoking at home • study controls for additional factors as follows – age, gender, over-crowding, region and occupation Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall level of bias – High** (concerns over self-reporting of outcome and exposure)	
Source of funding	None reported	

Bibliographic reference	Dales R E, Burnett R, and Zwanenburg H (1991) Adverse health effects among adults exposed to home dampness and moulds. The American review of respiratory disease 143(3), 505-9
Comments	

D.1.25 Diez 2002

Bibliographic reference	Diez U, Kroessner T, Rehwagen M, et al (2000) Effects of indoor painting and smoking on airway symptoms in atopy risk children in the first year of life - results of the LARS-study. International Journal of Hygiene and Environmental Health 203(1), 23-28	
Study design	Nested case control study	
Objective	To examine the influence of chemical indoor exposure in flats on the health outcome of atopy-risk children during the first years of life	
Setting/Study location	Germany	
Number of participants	475 premature and at risk children of allergies	
Selected population	Yes – selected for risk for allergies	
Participant characteristics	Description	
	Sex	Not reported
	Age	Up to 1 year
	Ethnicity	Not reported
	Education	Not reported
	SES	Not reported
	Building characteristics	Not reported
Inclusion criteria	Children with elevated cord-blood-IgE-level (>0.9 kU/1) Children with two family members suffering from atopic diseases, Children with birth-weight between 1500 and 2500 g	
Exclusion criteria		
Type of pollutant/exposure	Volatile organic compounds (VOC)	
Pollutant/exposure assessment	After passive sampling of VOC using 3M monitors the substances at the adsorption layers of the monitors were desorhed by means of carbon disulphide. The extracts were analysed qualitatively and quantitatively by capillary gaschromatography The detection limit of the studied components was between 0.1 and 1.0 pg per ml. 6 out of a total of 2.5 quantitatively detected components were further analysed relative to their importance to health effects.	
Outcome	Wheezing Pulmonary infections	
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between VOC, pulmonary infections and wheezing	

Bibliographic reference	**Diez U, Kroessner T, Rehwagen M, et al (2000) Effects of indoor painting and smoking on airway symptoms in atopy risk children in the first year of life - results of the LARS-study. International Journal of Hygiene and Environmental Health 203(1), 23-28**		
		Pulmonary infections at 6 weeks	Wheezing at 1 year
	Activity	aOR (95%CI)	aOR (95%CI)
	Restoration reported by parents	5.6 (1.3, 24.0)	1.9 (1.1, 3.5)
	Holding an animal		1.8 (1 0, 3.3)
	Styrene>2.0 µg/m^3	2.1 (1.1, 4.2)	
	Benzene > 5.6 µg/m^3	2.4 (1.3, 4.5)	
Follow up	1 year		
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • selected group of children at risk of allergies Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • Objective sampling Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for gas cooking • study controls for additional factors - heating, size of the flat, new furniture and domestic animals Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias: Moderate** risk (concerns over self-report of outcomes)		
Source of funding	Not reported		
Comments			

D.1.26 Diez 2003

Bibliographic reference	**Diez U, Rehwagen M, Rolle-Kampczyk U, et al (2003) Redecoration of apartments promotes obstructive bronchitis in atopy risk infants - Results of the LARS study. International Journal of Hygiene and Environmental Health 206(3), 173-179**
Study design	Prospective cohort study
Objective	To examine the effect of redecoration on the occurrence of obstructive bronchitis in one- and two-year-old children at risk of asthma
Setting/Study location	Germany
Number of participants	186
Selected population	Yes – children at risk of asthma
Participant characteristics	Description Sex Male: 99 (53%) Age: Up to 2 years Ethnicity: Not reported Education: Not reported SES: Not reported Building characteristics: Not reported
Inclusion criteria	Double positive family atopy anamnesis Cord blood IgE >0.9 kU/l Low birth weight between 1500 ± 2500 g.
Exclusion criteria	Not reported
Type of pollutant/exposure	Volatile organic compounds (VOCs): redecoration of apartment
Pollutant/exposure assessment	Questionnaire
Outcome	Obstructive bronchitis, Wheeze
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between redecoration of the apartment during pregnancy, 1st and 2nd year of life and its effect on obstructive bronchitis or wheezing in atopy risk children during their 1st and 2nd year of life
Follow up	2 years

Results:

	During 1st year		During 2nd year	
	Obstructive bronchitis	Wheezing	Obstructive bronchitis	Wheezing
Redecoration	aOR (95%CI)	aOR (95%CI)	aOR (95%CI)	aOR (95%CI)
Redecoration during pregnancy	0.6 (0.3, 1.3)	0.7 (0.3, 1.8)	1.5 (0.5, 4.3)	0.9 (0.3, 2.6)
Redecoration during 1st year	3.6 (1.4, 9.1)	2.5 (0.9, 7.3)	1.6 (0.5, 5.1)	1.5 (0.5, 5.1)
Redecoration during 2nd year	NA	NA	4.3 (1.6, 12.2)	3.7 (1.3, 10.1)

Bibliographic reference	**Diez U, Rehwagen M, Rolle-Kampczyk U, et al (2003) Redecoration of apartments promotes obstructive bronchitis in atopy risk infants - Results of the LARS study. International Journal of Hygiene and Environmental Health 206(3), 173-179**
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • selected group of children at risk of asthma Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • self-report Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for exposure to environmental tobacco smoke • study controls for additional factors – pets, dampness Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias:** High (concerns over self-report of exposure and outcomes)
Source of funding	**Government:** Ministry of Science and Arts, Germany
Comments	

D.1.27 Emenius 2003

Bibliographic reference	**Emenius G, Pershagen G, Berglind N, et al (2003)** NO_2**, as a marker of air pollution, and recurrent wheezing in children: a nested case-control study within the BAMSE birth cohort. Occupational and environmental medicine 60(11), 876-81**
Study design	Nested case-control study

Bibliographic reference	**Emenius G, Pershagen G, Berglind N, et al (2003) NO_2, as a marker of air pollution, and recurrent wheezing in children: a nested case-control study within the BAMSE birth cohort. Occupational and environmental medicine 60(11), 876-81**		
Objective	To examine the possible association between NO_2 exposure and recurrent wheezing during the first two years of life,		
Setting/Study location	Sweden		
Number of participants	540 children		
Selected population	No		
Participant characteristics	Description	Cases	Controls
	Sex		
	Male	116	170
	Female	65	189
	Age (years)	2 years	2 years
	Ethnicity	Not reported	Not reported
	Education	Not reported	Not reported
	Annual family income		
Inclusion criteria	Participants had to reside in the same dwelling as when they were born		
Exclusion criteria	None reported		
Type of pollutant/exposure	NO_2 reported as quartiles <8.4 μg/m^3; 8.4–11.6 μg/m^3; 11.7–15.6 μg/m^3; and >15.6 μg/m^3, respectively		
Pollutant/exposure assessment	Home inspection and self-report		
Outcome	Recurrent wheezing		
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs)		
		Recurrent wheezing	
	Exposure	aORs (95%CI)	
	NO_2		
	Quartile 1 <8.4 μg/m^3	Reference	
	Quartile 2 8.4–11.6 μg/m^3	0.96 (0.52, 1.77)	
	Quartile 3 11.7–15.6 μg/m^3	1.08 (0.57, 2.03)	
	Quartile 4 >15.6 μg/m^3	1.51 (0.81, 2.82)	
	Building age		
	1940–75	1.69 (1.01, 2.89)	
	1975 onwards	1.86 (1.05, 3.27)	
Follow up	2 years		
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average infant in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure		

Bibliographic reference	**Emenius G, Pershagen G, Berglind N, et al (2003) NO_2, as a marker of air pollution, and recurrent wheezing in children: a nested case-control study within the BAMSE birth cohort. Occupational and environmental medicine 60(11), 876-81**
	• Home inspection including sampling • written self-report Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for gender, heredity, maternal age and smoking, any breast feeding, and building age. Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall level of bias – Moderate** (concerns over self-reporting of outcome)
Source of funding	**Government:** Swedish National Board of Building Research, the Swedish Asthma and Allergy Association, the Swedish Foundation for Health Care Sciences and Allergy Research (Vardalstiftelsen), and the Swedish Environmental Protection Agency
Comments	

D.1.28 Emenius 2004

Bibliographic reference	**Emenius G, Svartengren M, Korsgaard J, et al (2004) Indoor exposures and recurrent wheezing in infants: A study in the BAMSE cohort. Acta Paediatrica, and International Journal of Paediatrics 93(7), 899-905**
Study design	Nested case-control study
Objective	To examine the relationship between the home environment and the development of recurrent wheezing during infancy
Setting/Study location	Sweden
Number of participants	540 children
Selected population	No

Bibliographic reference	**Emenius G, Svartengren M, Korsgaard J, et al (2004) Indoor exposures and recurrent wheezing in infants: A study in the BAMSE cohort. Acta Paediatrica, and International Journal of Paediatrics 93(7), 899-905**	
Participant characteristics	Description	
	Sex	Not reported
	Age (years)	Not reported
	Ethnicity	Not reported
	Education	Not reported
	Annual family income	Not reported
Inclusion criteria	Participants had to reside in the same dwelling as when they were born	
Exclusion criteria	None reported	
Type of pollutant/exposure	Damp, mould Repainting	
Pollutant/exposure assessment	Home inspection and self-report	
Outcome	Risk of recurrent wheezing	
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between recurrent wheezing, damp, mould and repainting	
		Recurrent wheezing
	Exposure	aORs (95%CI)
	Any dampness	1.4 (0.9, 2.2)
	Mould odour	2.0 (1.0, 3.9)
	Mould spots on surface material/tile joints in wet areas (shower/bath room)	1.0 (0.5, 1.7)
	Repainting	1.7 (1.1, 2.6)
Follow up	2 years	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average infant in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • Home inspection including sampling • written self-report Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for maternal smoking • study controls for other additional factor as follows - gender, heredity, breastfeeding and building age. Outcome Assessment of outcome • self-report	

Bibliographic reference	**Emenius G, Svartengren M, Korsgaard J, et al (2004) Indoor exposures and recurrent wheezing in infants: A study in the BAMSE cohort. Acta Paediatrica, and International Journal of Paediatrics 93(7), 899-905**
	Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for ☐ **Overall level of bias – Moderate** (concerns over self-reporting of outcome)
Source of funding	Government: Swedish National Board of Building Research, the Swedish Asthma and Allergy Association, the Swedish Foundation for Health Care Sciences and Allergy Research (Va°rdalstiftelsen), and the Swedish Environmental Protection Agency
Comments	

D.1.29 Emenius 2004 b

Bibliographic reference	**Emenius G, Svartengren M, Korsgaard J, et al (2004) Building characteristics, indoor air quality and recurrent wheezing in very young children (BAMSE). Indoor air 14(1), 34-42**		
Study design	Nested case-control study		
Objective	To assess the influence of building characteristics and indoor air quality, using objective measurements of ventilation rate and indoor humidity on recurrent wheezing in children up to the age of 2 years.		
Setting/Study location	Sweden		
Number of participants	540 children		
Selected population	Yes – cases selected on basis of recurrent wheezing		
Participant characteristics	Description	Cases	Controls
	Sex		
	Male	116	170
	Female	65	189
	Age (years)	2 years	2 years
	Ethnicity	Not reported	Not reported
	Education	Not reported	Not reported
	Annual family income		
	Building characteristics		
	Building age:		
	houses built before 1940	reference –	
	houses built between 1940–1975	83 (45.9)	153 (42.6)
	houses built after 1975	63 (34.8)	104 (29.0)
	apartment buildings erected after 1940	104 (57.8)	178 (50.1)
	Single-family homes	44 (24.3)	90 (25.0)
	single-family homes: cellar basement	9 (5.0)	25 (7.0)

Bibliographic reference	**Emenius G, Svartengren M, Korsgaard J, et al (2004) Building characteristics, indoor air quality and recurrent wheezing in very young children (BAMSE). Indoor air 14(1), 34-42**		
	single-family: crawl space/concrete slab	34 (18.9)	61 (17.2)
	single-family homes with exhaust ventilation and crawl space/concrete slab foundation	12 (6.7)	13 (3.7)
	Exhaust ventilation	85 (47.0)	151 (42.1)
	Balanced ventilation	43 (23.8)	78 (21.8)
	Ventilation rate 0.5 ACH	130 (71.8)	240 (67.0)
	Absolute indoor humidity > median, 5.8 g/kg	102 (56.4)	167 (46.7)
	Relative humidity >45%	25 (13.8)	43 (12.0)
	Indoor temperature > median, 21.7°C	93 (51.4)	182 (50.7)
	Windowpane condensation	26(14.4)	26(7.2)
Inclusion criteria	Participants had to reside in the same dwelling as when they were born		
Exclusion criteria	None reported		
Type of pollutant/exposure	NO_2 Ventilation rate Humidity		
Pollutant/exposure assessment	Home inspection and self-report		
Outcome	Recurrent wheezing		
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs)		
		Recurrent wheezing	
	Exposure	aORs (95%CI)	
	Single-family homes vs. apartments	2.5 (1.3, 4.8)	
	Houses built before 1940	Referent	
	houses built between 1940–1975	2.3 (1.2, 4.3)	
	houses built after 1975 63	2.5 (1.3, 4.8)	
	apartment buildings erected after 1940 vs before 1940	0.9 (0.6, 1.5)	
	single-family homes: cellar basement	1.5 (0.5, 4.5)	
	single-family: crawl space/concrete slab	2.5 (1.1, 5.4)	
	single-family homes with exhaust ventilation and crawl space/concrete slab foundation	3.0 (1.1, 8.0)	
	Exhaust ventilation (vs. natural ventilation)	1.1 (0.6, 2.0)	
	Balanced ventilation (vs. natural ventilation)	0.8 (0.4, 1.7)	
	Ventilation rate 0.5 ACH vs. lower	1.3 (0.8, 2.0)	
	Absolute indoor humidity > median, 5.8 g/kg	1.7 (1.0, 2.9)	
	Relative humidity >45%	0.8 (0.4, 1.5)	
	Indoor temperature > median, 21.7°C	0.9 (0.6, 1.4)	
	Windowpane condensation	2.2 (1.1, 4.5)	
Follow up	2 years		
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average infant in the community		

Bibliographic reference	Emenius G, Svartengren M, Korsgaard J, et al (2004) Building characteristics, indoor air quality and recurrent wheezing in very young children (BAMSE). Indoor air 14(1), 34-42
	Selection of the non-exposed cohort • drawn from the same community as the exposed cohort □ Ascertainment of exposure • Home inspection including sampling • written self-report Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for gender, heredity, maternal age and smoking, any breast feeding, and building age. Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for □ **Overall level of bias – Moderate** (concerns over self-reporting of outcome)
Source of funding	**Government:** Swedish National Board of Building Research, the Swedish Asthma and Allergy Association, the Swedish Foundation for Health Care Sciences and Allergy Research (Va°rdalstiftelsen), and the Swedish Environmental Protection Agency
Comments	

D.1.30 Engvall 2001

Bibliographic reference	Engvall K, Norrby C, and Norback D (2001) Sick building syndrome in relation to building dampness in multi-family residential buildings in Stockholm. International archives of occupational and environmental health 74(4), 270-8
Study design	Retrospective cohort study
Objective	To investigate relationship between symptoms and signs of building dampness
Setting/Study location	Sweden
Number of participants	9,808 adults
Selected population	No

Bibliographic reference	**Engvall K, Norrby C, and Norback D (2001) Sick building syndrome in relation to building dampness in multi-family residential buildings in Stockholm. International archives of occupational and environmental health 74(4), 270-8**	
Participant characteristics	Sex	
	Female	5783 (60%)
	Age (years)	
	18 – 44	4904 (51%)
	45 – 64	2397 (25%)
	> 65	2365 (24%)
	Ethnicity	Not reported
	Education	Not reported
	Annual family income	Not reported
Inclusion criteria	Not reported	
Exclusion criteria	Not reported	
Type of pollutant/exposure	Dampness	
Pollutant/exposure assessment	Self-administered questionnaire	
Outcome	Risk of eye symptoms, nasal symptoms, throat symptoms, cough, headache, fatigue and facial skin symptoms	
Results		Condensation on windows
	Eye irritation	3.14 (3.01, 3.27)
	Nasal symptoms	2.72 (2.62, 2.81)
	Throat symptoms	3.22 (3.09, 3.35)
	Cough	2.58 (2.47, 2.70)
	Facial skin symptoms	2.11 (2.02, 2.20)
	Headache	3.30 (3.19, 3.43)
	Tiredness	2.19 (2.12, 2.25)
		High air humidity in bathroom
	Eye irritation	2.94 (2.83, 3.05)
	Nasal symptoms	1.94 (1.88, 2.01)
	Throat symptoms	3.23 (3.12, 3.25)
	Cough	2.30 (2.21, 2.40)
	Facial skin symptoms	2.42 (2.33, 2.51)
	Headache	3.07 (2.96, 3.17)
	Tiredness	2.16 (2.11, 2.22)
		Mouldy odour
	Eye irritation	3.75 (3.60, 3.92)
	Nasal symptoms	2.83 (2.73, 2.93)
	Throat symptoms	3.48 (3.33, 3.62)
	Cough	3.30 (3.16, 3.46)
	Facial skin symptoms	2.93 (2.80, 3.06)
	Headache	3.37 (3.24, 3.51)
	Tiredness	2.38 (2.31, 2.46)
		History of water leakage
	Eye irritation	1.57 (1.50, 1.65)

Bibliographic reference	Engvall K, Norrby C, and Norback D (2001) Sick building syndrome in relation to building dampness in multi-family residential buildings in Stockholm. International archives of occupational and environmental health 74(4), 270-8	
	Nasal symptoms	1.36 (1.31, 1.41)
	Throat symptoms	2.18 (2.09, 2.28)
	Cough	1.52 (1.44, 1.59)
	Facial skin symptoms	1.56 (1.48, 1.63)
	Headache	1.27 (1.21, 1.33)
	Tiredness	1.35 (1.30, 1.39)
Follow up	5 years	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average adult in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • written self-report Demonstration that outcome of interest was not present at start of study • No Comparability Comparability of cohorts on the basis of the design or analysis • study controls for type of ventilation • study controls for additional factors as follows – age, gender Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall level of bias – High** (concerns over self-reporting of outcome and exposure)	
Source of funding	Government: Building Research Foundation, City of Stockholm, Social Board of Welfare and Health, and Swedish National Institute of Public Health	
Comments		

D.1.31 Engvall 2010

Bibliographic reference	Engvall K, Hult M, Corner R, et al. (2010) A new multiple regression model to identify multi-family houses with a high prevalence of sick building symptoms “SBS”, within the healthy sustainable house study in Stockholm (3H). Int Arch Occup Environ Health 83: 85–94
Study design	Retrospective cohort study

<table>
<tr><th>Bibliographic reference</th><th>Engvall K, Hult M, Corner R, et al. (2010) A new multiple regression model to identify multi-family houses with a high prevalence of sick building symptoms “SBS”, within the healthy sustainable house study in Stockholm (3H). Int Arch Occup Environ Health 83: 85–94</th></tr>
<tr><td>Objective</td><td>To develop a new model to identify residential buildings with higher frequencies of “sick building systems”: a set of non-specific symptoms occurring in a particular building and not caused by specific illness, such as allergy or infection.</td></tr>
<tr><td>Setting/Study location</td><td>Sweden</td></tr>
<tr><td>Number of dwellings and participants</td><td>Number of dwellings: 11,160 dwellings in 481 buildings
Number of participants: 7,640 adults</td></tr>
<tr><td>Selected population</td><td>No</td></tr>
<tr><td>Building and Participant characteristics</td><td>Building characteristics:
Location: urban
Dwelling type: apartments
Building age: varied
Type of ownership/tenancy: publicly owned, 29%; owned by inhabitant, 52%; private landlord, 19%
Participant characteristics:
Age: 18 to 44 years, 46%; 45 to 54 years, 32%; >54 years 22%
Current smoker: 14%
Hay fever: 24%
Atopy: 40%</td></tr>
<tr><td>Inclusion criteria</td><td>Apartments in multi-family buildings were included. No further details were provided</td></tr>
<tr><td>Exclusion criteria</td><td>Detached and semi-detached houses, as well as buildings used as nursing homes for the elderly were excluded</td></tr>
<tr><td>Building factor/exposure</td><td>Type of ownership: self-owned versus rented</td></tr>
<tr><td>Building factor/exposure assessment</td><td>Data on property ownership was obtained from the Stockholm central building register.</td></tr>
<tr><td>Outcome</td><td>Eye, nasal, throat irritation, and coughing that occupant considered to be caused by the indoor environment of their building/property. For the context of this review these symptoms are considered likely to be caused by air pollutants.</td></tr>
<tr><td>Results</td><td><table>
<tr><th></th><th colspan="4">Odds ratio (95%CI)</th></tr>
<tr><th>Building factor</th><th>Eye irritation</th><th>Nasal irritation</th><th>Throat irritation</th><th>Coughing</th></tr>
<tr><td>Rented vs. self-owned</td><td>2.07
(1.19, 3.58)</td><td>2.07
(1.33, 3.20)</td><td>1.98
(0.98, 3.97)</td><td>1.85
(0.94, 3.65)</td></tr>
</table>
*odds ratios were calculated using multiple logistic regression modelling</td></tr>
<tr><td>Follow up</td><td>Minimum of 6 months</td></tr>
<tr><td>Study methods</td><td>Methods:</td></tr>
</table>

Bibliographic reference	Engvall K, Hult M, Corner R, et al. (2010) A new multiple regression model to identify multi-family houses with a high prevalence of sick building symptoms "SBS", within the healthy sustainable house study in Stockholm (3H). Int Arch Occup Environ Health 83: 85–94
	Residences were selected from a central building register by stratified random sampling. Strata were based on building size (number of apartments) and age in 6 classes (based on major changes in building technology). In each selected dwelling, one randomly selected person who was over 18 years and living in the apartment or over 6 months by combining the building register with the civil registration register. A self-administered postal questionnaire (Stockholm Indoor Environmental Questionnaire; SIEQ) was sent to these individuals. The questionnaire assessed demographic traits, medical conditions and building-related allergies or symptoms. Statistical analysis: multivariate logistic regression.
Newcastle-Ottawa Scale	Selection Representativeness of the exposed cohort • truly representative of the average resident in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • secure record (building register) Demonstration that outcome of interest was not present at start of study • No Comparability Comparability of cohorts on the basis of the design or analysis • study controls for age of the building and the number of residences Outcome Assessment of outcome • self-reported Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias: Moderate** (Concerns over sell-report of outcome)
Source of funding	**Government:** City of Stockholm, The Swedish Research Council, and Stockholm county council
Comments	No additional comments

D.1.32 Farrow 2003

Bibliographic reference	Farrow A, Taylor H, Northstone K, et al (2003) Symptoms of mothers and infants related to total volatile organic compounds in household products. Archives of Environmental Health 58(10), 633-641
Study design	Prospective cohort study
Objective	Not reported
Setting/Study location	United Kingdom

Bibliographic reference	**Farrow A, Taylor H, Northstone K, et al (2003) Symptoms of mothers and infants related to total volatile organic compounds in household products. Archives of Environmental Health 58(10), 633-641**		
Number of participants	14,541 pregnant women and 13,971 of their children		
Selected population	No		
Participant characteristics	Description		
	Sex	Not reported	
	Age	Up to 1 year	
	Ethnicity	Not reported	
	Education	Not reported	
	SES	Not reported	
	Building characteristics	Not reported	
Inclusion criteria	Expected date of delivery between April 1, 1991 and December 31, 1992 Place of residence within the three Bristol-based health districts of the former county of Avon, UK		
Exclusion criteria	Not reported		
Type of pollutant/exposure	Total volatile organic compounds (TVOCs): Air freshener use Aerosol use		
Pollutant/exposure assessment	Questionnaire and random samples in 170 homes as follows the home of each pregnant woman was monitored from approximately 6 month gestation to 6 months following birth. VOCs were monitored with TENAX tubes which were exposed for more than 1 month for each of the 12 months of sampling in the main bedroom and living room of the home.		
Outcome	Questionnaire		
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between Infants' Symptoms during the First 6 month Postpartum and Air Freshener and Aerosol Use during pregnancy		

	Frequency of air freshener use			
	Symptom	Never/< once per week	Once/week	Daily/most days
		aOR (95%CI)	aOR (95%CI)	aOR (95%CI)
	Diarrhoea (infant)	1.00 Ref	1.20 (1.06, 1.35)	1.10 (0.99, 1.23)
	Vomiting (infant)	1.00 Ref	1.06 (0.93, 1.20)	1.09 (0.97, 1.22)
	Earache (Infant)	1.00 Ref	1.24 (1.02, 1.50)	1.30 (1.09, 1.54)
	Frequency of aerosol use			
	Diarrhoea (infant)	1.00 Ref	1.09 (0.93, 1.28)	1.22 (1.09, 1.36)
	Vomiting (infant)	1.00 Ref	1.17 (1.00, 1.37)	1.14 (1.02, 1.27)
	Earache (infant)	1.00 Ref	1.00 (0.78, 1.29)	1.05 (0.84, 1.25)
	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between Maternal Symptoms of Depression and Headache during the 8 months Following Birth of the Infant and Reported Air Freshener and Aerosol Use during Pregnancy			

Bibliographic reference	**Farrow A, Taylor H, Northstone K, et al (2003) Symptoms of mothers and infants related to total volatile organic compounds in household products. Archives of Environmental Health 58(10), 633-641**			
	Frequency of air freshener use			
	Symptom	Never/< once per week	Once/week	Daily/most days
		aOR (95%CI)	aOR (95%CI)	aOR (95%CI)
	Depression (mother)	1.00 Ref	1.11 (0.96, 1.29)	1.19 (1.05, 1.36)
	Headache (mother)	1.00 Ref	1.06 (0.94, 1.19)	1.24 (1.11, 1.38)
	Frequency of aerosol use			
	Depression (mother)	1.00 Ref	1.06 (0.88, 1.27)	1.03 (0.91, 1.17)
	Headache (mother)	1.00 Ref	1.16 (1.00, 1.35)	1.25 (1.13, 1.39)
	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between Maternal Symptoms 9–21 month after the Infant Was Born That Were Associated Significantly with Reported Air Freshener and Aerosol Use during Pregnancy			
	Frequency of air freshener use			
	Symptom		Once/week	Daily/most days
			aOR (95%CI)	aOR (95%CI)
	Headache (mother)		1.29 (1.14, 1.47)	1.22 (1.09, 1.36)
	Cough or cold (mother)		1.03 (0.87, 1.20)	0.82 (0.72, 0.93)
	Diarrhoea (mother)		1.14 (1.00, 1.31)	1.14 (1.01, 1.28)
	Frequency of aerosol use			
	Headache (mother)		1.35 (1.15, 1.59)	1.21 (1.10, 1.34)
	Influenza (mother)		1.03 (0.85, 1.24)	0.87 (0.77, 0.99)
	Urinary tract infection (mother)		1.16 (0.89, 1.52)	1.23 (1.04, 1.45)
Follow up	21 months			
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average mother / child in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort □ Ascertainment of exposure • questionnaire and samples form randomly selected houses Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for number of smokers in the home • study controls for any additional factors - education, mother's age, housing tenure, number of children in the home, paid job subsequent to birth of the child, dampness or condensation in the home, mould in the home, type of winter heating fuel.) Outcome			

Bibliographic reference	Farrow A, Taylor H, Northstone K, et al (2003) Symptoms of mothers and infants related to total volatile organic compounds in household products. Archives of Environmental Health 58(10), 633-641
	Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias: Moderate** (Concerns over self-report of outcomes)
Source of funding	**Government:** Medical Research Council, the Department of Health, the Department of the Environment, Ministry of Agriculture Fisheries and Food, **Industry:** Nutricia, and other companies **Charity:** the Wellcome Trust
Comments	

D.1.33 Franck 2014

Bibliographic reference	Franck U, Weller A, Roder SW, et al (2014) Prenatal VOC exposure and redecoration are related to wheezing in early infancy. Environment international 73, 393-401	
Study design	Prospective cohort	
Objective	To evaluate the impact of prenatal compared to postnatal decoration and associated VOC exposure	
Setting/Study location	Germany	
Number of participants	629 mother-baby dyads (465 completed)	
Selected population	No	
Participant characteristics	Building characteristics: Location: Dwelling type: Building age: Type of ownership/tenancy Individual characteristics: Age: Current smoker (reported as mother) Hay fever: Atopy: 1 parent 2 parents	Urban Not reported Not reported Not reported Not reported 53 (11.4%) Not reported (229 (49.2%) 81 (17.4%)

Bibliographic reference	**Franck U, Weller A, Roder SW, et al (2014) Prenatal VOC exposure and redecoration are related to wheezing in early infancy. Environment international 73, 393-401**		
Inclusion criteria	Pregnant women between the 20th and 34th weeks of gestation		
Exclusion criteria	Mothers with autoimmune diseases M0thers with infections during the pregnancy		
Type of pollutant/exposure	VOCs as a result of redecoration		
Pollutant/exposure assessment	Passive samples taken over a period of 1 month using a diffusion sampler (OVM 300 from 3M company) placed in the middle of the room at between 1.5 and 2 metres height in the 34th week of gestation and the end of 1st year of life. The sampler was placed in the living room or the sleeping room of the mother during pregnancy and in the child's bedroom and room where the child spent daytime.		
Outcome	AOR (95%CI) for Physician-diagnosed obstructive bronchitis, non-obstructive bronchitis or asthma in first 12 months of life Parent report of wheezing in the first 12 month of life		
Results	Any type of redecoration	Recurrent wheeze	Obstructive bronchitis
	During pregnancy	2.04 (0.78, 5.28)	Not reported
	During 1st year of life	1.89 (0.71, 5.06)	Not reported
	New furniture		
	During pregnancy	1.94 (0.72, 5.26)	Not reported
	During 1st year of life	2.26 (0.83, 6.17)	Not reported
	Painting		
	During pregnancy	2.35 (0.89, 6.20)	5.46 (1.09, 27.20)
	During 1st year of life	2.53 (0.85, 7.49)	Not reported
	Floor covering (wall to wall carpet)		
	During pregnancy	5.39 (1.75, 16.54)	4.39 (1.01, 19.05)
	During 1st year of life	4.18 (0.40, 43.70)	Not reported
	Type of floor covering - pregnancy	Treated wheeze	
	Parquet	5.78 (0.30, 111.08)	
	Laminate	4.46 (1.01, 19.63)	
	Wall to wall carpet	4.57 (1.14, 18.39)	
	PVC	24.7 (2.18, 280.39)	
	Other	2.34 (0.19, 29.29)	
	Adhesive	7.05 (1.61, 30.92)	
	Non-adhesive	5.46 (1.44, 20.62)	
	Type of floor covering - 1st year of life		
	Parquet	No data	
	Laminate	2.44 (0.40, 14.74)	
	Wall to wall carpet	0.98 (0.10, 9.83)	
	PVC	51.7 (3.21, 833.2)	
	Other	1.53 (0.10, 22.36)	

Bibliographic reference	**Franck U, Weller A, Roder SW, et al (2014) Prenatal VOC exposure and redecoration are related to wheezing in early infancy. Environment international 73, 393-401**		
	Adhesive Non-adhesive	1.18 (0.06, 22.75) 2.49 (0.57, 10.85)	
Follow up	12 months		
Study methods	Part of Lifestyle and Environmental Factors and their Influence of Newburn Allergy risk (LINA) birth cohort Children were followed up once a year with questionnaire evaluations, clinical examinations and indoor measurements. Univariate and multivariate analyses were performed for binary disease outcomes using logistic regression and adjusted odds ratios (aOR) were calculated.		
Newcastle-Ottawa Scale	Selection Representativeness of the exposed cohort • truly representative of the average pregnant woman in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • Validated sampling system Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for parent's history of atopy • study controls for gender, season of birth, breast-feeding, cat ownership, parental education level, and smoking during pregnancy/ETS during pregnancy confirmed by maternal cotinine levels Outcome Assessment of outcome independent blind assessment • self-report by parents Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • subjects lost to follow up unlikely to introduce bias as description provided of those lost) **Overall assessment: Low**		
Source of funding	**Private -** Helmholtz Centre for Environmental Research GmbH (this centre is funded by government)		
Comments	None		

D.1.34 Gan 2010

Bibliographic reference	Gan WQ, Tamburic L, Davies HW, et al (2010) Changes in residential proximity to road traffic and the risk of death from coronary heart disease. Epidemiology (Cambridge, and Mass.) 21(5), 642-9			
Study design	Prospective cohort study			
Objective	To explore the association between changes in residential proximity to road traffic and the risk of CHD mortality			
Setting/Study location	Canada			
Number of participants	450,283 adults			
Participant characteristics		No. (%)	No. (%)	No. (%)
	Description	Not exposed (n= 328,609)	Moved close to traffic (n= 15747)	Consistent Exposure to Traffic (n=52,948)
	Sex	Not reported	Not reported	Not reported
	Age (years); mean (SD)	58.7 (10.4)	58.6 (10.2)	61.0 (10.9)
	Comorbidity			
	Diabetes	6243 (1.9)	331 (2.1)	1324 (2.5)
	COPD	12158 (1.0)	189 (1.2)	794 (1.5)
	Hypertensive heart disease	12158 (3.7)	630 (4.0)	2436 (4.6)
	Any of the above	18402 (5.6)	1008 (6.4)	3812 (7.2)
	Ethnicity	Not reported	Not reported	Not reported
	(Maintenance) medication use	Not reported	Not reported	Not reported
	Maternal asthma and/or atopic	Not reported	Not reported	Not reported
	Parental education	Not reported	Not reported	Not reported
	Annual family income	Not reported	Not reported	Not reported
	Building characteristics	Not reported	Not reported	Not reported
Inclusion criteria	Registered with the provincial health insurance plan, which provides universal coverage to the resident population Age 45–85 years Without previous diagnosis of CHD			
Exclusion criteria	Not reported			
Type of pollutant/exposure	Proximity to traffic			
Pollutant/exposure assessment	Authors used high-resolution land-use regression models to evaluate exposure levels to traffic-related air pollutants. Using detailed residential history and corresponding monthly concentrations of traffic-related air pollutants during the 5-year exposure period, average concentrations of air pollutants were calculated for each subject.			

<table>
<tr><th>Bibliographic reference</th><th colspan="4">Gan WQ, Tamburic L, Davies HW, et al (2010) Changes in residential proximity to road traffic and the risk of death from coronary heart disease. Epidemiology (Cambridge, and Mass.) 21(5), 642-9</th></tr>
<tr><td>Outcome</td><td colspan="4">Coronary Heart Disease Mortality</td></tr>
<tr><td rowspan="4">Results</td><td colspan="4">Adjusted odds ratios (aRRs) and 95% confidence intervals (CIs) for association between proximity to traffic and Coronary Heart Disease Mortality</td></tr>
<tr><td></td><td>Not Exposed to Traffic</td><td>Moved Close to Traffic</td><td>Consistent Exposure to Traffic</td></tr>
<tr><td></td><td>RR (95%CI)</td><td>RR (95%CI)</td><td>RR (95%CI)</td></tr>
<tr><td>≤150 m Highway or ≤50 m major road</td><td>1.00</td><td>1.20 (1.00, 1.43)</td><td>1.29 (1.18, 1.41)</td></tr>
<tr><td>Follow up</td><td colspan="4">5 years</td></tr>
<tr><td>Study methods</td><td colspan="4">A case of CHD death was defined as a death record in the provincial death registration database with CHD (ICD-9 codes 410–414, 429.2 and ICD-10 codes I20 –I25) as the cause of death. A small proportion of deaths were identified using provincial hospitalization records.
To determine the association between residential proximity to traffic (predictor variable) and the risk of CHD mortality (dependent variable), authors first performed bi-variable logistic regression analysis using the non-exposed group as the reference category. Then performed multivariable logistic regression analysis to adjust for confounders. These analyses were repeated for different combinations of road types (highway or major road) and distances (50 or 150 m)</td></tr>
<tr><td>Risk of bias (Newcastle-Ottawa Scale)</td><td colspan="4">Selection
Representativeness of the exposed cohort
• truly representative of the average population in the community
Selection of the non-exposed cohort
• drawn from the same community as the exposed cohort
Ascertainment of exposure
• validated measurements used
Demonstration that outcome of interest was not present at start of study
• Yes
Comparability
Comparability of cohorts on the basis of the design or analysis
• study controls for age, sex, neighbourhood socioeconomic status, and pre-existing comorbidities
Outcome
Assessment of outcome
• from the death registration database and from hospitalization records
Was follow-up long enough for outcomes to occur
• Yes
Adequacy of follow up of cohorts
• 8% loss to follow up
Overall risk of bias: low</td></tr>
<tr><td>Source of funding</td><td colspan="4">Government: Health Canada via an agreement with the British Columbia Centre for Disease Control to the Border Air Quality Study; the Centre for Health and Environment Research at The University of British</td></tr>
</table>

Bibliographic reference	**Gan WQ, Tamburic L, Davies HW, et al (2010) Changes in residential proximity to road traffic and the risk of death from coronary heart disease. Epidemiology (Cambridge, and Mass.) 21(5), 642-9**
	Columbia, supported by the Michael Smith Foundation for Health Research; the Canadian Institutes of Health Research Frederick Banting and Charles Best Canada Graduate Scholarship and by the Michael Smith Foundation for Health Research Senior Graduate Studentship (to W.G.); and a Michael Smith Foundation for Health Research Senior Scholar Award
Comments	The study cohort was constructed using linked administrative databases that did not include certain important information about individual cardiovascular risk factors (such as active or passive smoking status, body mass index, and individual SES).

D.1.351 Garshick 2003

Bibliographic reference	**Garshick E, Laden F, Hart JE, et al (2003) Residence near a major road and respiratory symptoms in U.S. Veterans. Epidemiology (Cambridge, and Mass.) 14(6), 728-36**		
Study design	Prospective cohort study		
Objective	To assess the relation between exposure to motor vehicle exhaust and respiratory symptoms in adults		
Setting/Study location	United States		
Number of participants	2628 adults		
Selected population	No		
Participant characteristics	Description	No.	%
	Sex	Not reported	Not reported
	Age (years)	Not reported	Not reported
	Ethnicity	Not reported	Not reported
	(Maintenance) medication use	Not reported	Not reported
	Maternal asthma and/or atopic	Not reported	Not reported
	Education		
	<12th Grade	706	27
	12th Grade	1011	38
	>12th Grade	858	33
	Missing	53	2
	Annual family income (employment status)		
	Employed	996	38
	Unemployed	144	5
	Retired	1458	55
	Missing	30	1
	Building characteristics	Not reported	Not reported
Inclusion criteria	Not reported		
Exclusion criteria	Not reported		

Bibliographic reference	**Garshick E, Laden F, Hart JE, et al (2003) Residence near a major road and respiratory symptoms in U.S. Veterans. Epidemiology (Cambridge, and Mass.) 14(6), 728-36**			
Type of pollutant/exposure	Proximity to a major road			
Pollutant/exposure assessment	Exposure to motor vehicle exhaust was defined by the distance from each residential address at the time of the questionnaire mailing to the nearest major road and by the average daily traffic count for that road. Average daily traffic counts are defined as the average number of vehicles per weekday based on an average of the counts obtained throughout the year.			
Outcome	Persistent Wheeze, Chronic Cough, Chronic Phlegm			
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between distance of residence to a major road and respiratory symptoms			
		Persistent Wheeze	Chronic Cough	Chronic Phlegm
	Distance to road (meters)	aOR (95%CI)	aOR (95%CI)	aOR (95%CI)
	≤50	1.31 (1.00, 1.71)	1.24 (0.92, 1.68)	1.18 (0.88, 1.56)
	>50 to 100	0.87 (0.61, 1.25)	0.92 (0.61, 1.39)	1.07 (0.73, 1.56)
	>100 to 200	1.11 (0.83, 1.48)	1.21 (0.87, 1.67)	1.24 (0.91, 1.68)
	>200 to 300	1.11 (0.80, 1.54)	1.30 (0.90, 1.87)	1.23 (0.87, 1.73)
	>300 to 400	1.19 (0.83, 1.72)	1.34 (0.90, 2.01)	1.32 (0.91, 1.94)
	>400	1.00	1.00	1.00
Follow up	Not reported			
Study methods	Outcome was defined by self-report of symptoms. “Chronic cough” was cough on most days for 3 consecutive months or more during the year. “Chronic phlegm” was phlegm on most days for 3 consecutive months or more during the year. “Persistent wheeze” was wheezing with a cold and occasionally apart from colds, or on most days or nights. Authors used a multiple logistic regression model to examine the association of exposure to motor vehicle exhaust with each respiratory symptom independently and to adjust for potential confounders. Exposure to motor vehicle exhaust was examined in 2 ways, by distance to the closest major road and by the average daily traffic count for that road.			
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average veteran population in the community Selection of the non-exposed cohort • no description of the derivation of the non-exposed cohort Ascertainment of exposure • validated measurements used Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for smoking, occupational dust and age Outcome			

Bibliographic reference	Garshick E, Laden F, Hart JE, et al (2003) Residence near a major road and respiratory symptoms in U.S. Veterans. Epidemiology (Cambridge, and Mass.) 14(6), 728-36
	Assessment of outcome • self-report of respiratory symptoms Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias: Moderate** (potential for response bias from outcome assessment)
Source of funding	**Government:** NIH/NCI
Comments	Authors reported that study lacks information on duration of residence in each address, and information regarding home exposures to nitrogen oxides from cooking or heating. Also lacks information regarding the health status of non-responders.

D.1.36 Gent 2009

Bibliographic reference	Gent JF, Belanger K, Triche EW, et al (2009) Association of pediatric asthma severity with exposure to common household dust allergens. Environmental Research 109(6), 768-774	
Study design	Prospective cohort	
Objective	To examine the dose response relationships and health impact of five common household dust allergens on disease severity	
Setting/Study location	United States	
Number of participants	300 children	
Selected population	Yes – All had asthma	
Participant characteristics	Individual characteristics	
	Age	Mean (SD): 8.6 (2.0)
	Sex	Male N (%): 191 (63.7) Female N (%): 109 (36.3)
	Race / ethnicity	White/Asian/White/Asian/Another N (%): 199 (66.3) Black N (%): 46 (15.3) Hispanic N (%): 55 (18.3)
	SES	Maternal education N (%): <12 years, 23 (7.7) 12-15 years, 162 (54.2) ≥ 16 years, 114 (33.1)
	Asthma severity (GINA score), N (%) 0 No symptoms 1 Intermittent 2 Mild persistent	 9 (3.0) 135 (45) 58 (19.3)

Bibliographic reference	**Gent JF, Belanger K, Triche EW, et al (2009) Association of pediatric asthma severity with exposure to common household dust allergens. Environmental Research 109(6), 768-774**			
	3 Moderate persistent	61 (20.3)		
	Building characteristics	Not reported		
Inclusion criteria	- Asthmatic children - physician-diagnosed asthma - age less than 12 years - asthma symptoms or medication use in the previous 12 months			
Exclusion criteria	Not reported			
Type of pollutant / exposure	dust mite (*Der p* 1) allergen			
Pollutant / exposure assessment	ELISA (enzyme-linked immunosorbent assay) method			
Outcome	Daily symptoms and medication use			
Results	Adjusted Odds Ratio and 95% Confidence Intervals			
		Moderate/severe GINA score* aOR (95%CI)	Wheeze ≥30 days aOR (95%CI)	Controller meds≥9 months aOR (95%CI)
	Main living Area *Der p 1 (μg/g)* <0.10 0.10 to <2.0 2.0 to<10.0 ≥10.0	1.0 0.93 (0.41, 2.10) 2.93 (1.37, 6.30) 2.55 (1.13, 5.73)	1.0 1.05 (0.38,2.84) 1.55 (0.62,3.85) 2.01 (0.78,5.19)	1.0 0.61 (0.27,1.35) 2.52 (1.17,5.42) 2.17 (0.97,4.86)
	Bed *Der p 1 (μg/g)* <0.10 0.10 to <2.0 2.0 to<10.0 ≥10.0	1.0 0.99 (0.47, 2.08) 2.73 (1.32,5.64) 1.19 (0.46,3.08)	1.0 1.70 (0.68,4.22) 1.60 (0.64,4.00) 3.58 (1.28,9.97)	1.0 1.35 (0.66,2.73) 2.16 (1.04,4.48) 1.41 (0.57,3.46)
	*a 5 point asthma severity score (from 0 [no symptoms or medication use] to 4 [severe persistent], based on the Global Initiative for Asthma (GINA) guidelines was calculated for each month of the year-long prospective study.			
Follow up	1 year			
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average child in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • objective measure Demonstration that outcome of interest was not present at start of study			

Bibliographic reference	**Gent JF, Belanger K, Triche EW, et al (2009) Association of pediatric asthma severity with exposure to common household dust allergens. Environmental Research 109(6), 768-774**
	• Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for general atopy • study controls for additional factors - age, gender, ethnicity and mother's education. Outcome Assessment of outcome • record linkage Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias: Low**
Source of funding	**Government:** NIH:
Comments	

D.1.37 Gent 2012

Bibliographic reference	**Gent JF, Kezik JM, Hill ME, et al (2012) Household mould and dust allergens: exposure, sensitization and childhood asthma morbidity. Environmental research 118, 86-93**	
Study design	Prospective cohort study	
Objective	To examine the association between specific allergic status, level of household exposure to specific allergens and asthma severity as measured by days of wheeze, persistent cough, rescue medication use, and an asthma severity score for the month immediately following allergy testing and sample collection.	
Setting/Study location	United States	
Number of participants	1233 children	
Selected population	Yes – children had asthma	
Participant characteristics	Description	
	Sex	
	Male	726 (58.9%)
	Female	507 (41.1%)
	Age (years) - Mean (SD)	7.4 (1.7)
	Ethnicity	
	White	488 (39.6%)

Bibliographic reference	Gent JF, Kezik JM, Hill ME, et al (2012) Household mould and dust allergens: exposure, sensitization and childhood asthma morbidity. Environmental research 118, 86-93	
	Black	239 (19.4%)
	Hispanic	444 (36.0%)
	Mixed and other	62 (5.0%)
	Maternal asthma and/or atopic	
	Parental education Maternal)	
	<12	211 (17.1%)
	12–15	660 (53.6%)
	≥16	361 (29.3%)
	Annual family income	Not reported
	Building characteristics	Not reported
Inclusion criteria	Children were eligible if they were age 5–10 Had a caregiver who spoke English Had active asthma defined as two of the following: physician diagnosis, asthma symptoms within the past 12 months (wheeze, persistent cough, chest tightness, shortness of breath), and/or use of prescription asthma medication within the past 12 months.	
Exclusion criteria	Not reported	
Type of pollutant/exposure	House dust mite (HDM) Mould Pets	
Pollutant/exposure assessment	Environmental samples were collected once during the study at the time of the enrolment home visit. Indoor airborne fungal propagules were collected using a Burkard Portable Sampler) in the main living area. The research assistant obtained a single sample using a plate with dichloran-18% glycerol (DG-18) agar, and a sampler air collection rate of 20 liters per minute [L/min] for 1 min. Samples were brought to the study laboratory for incubation at 25 °C for approximately 7 days after which the resulting fungal colonies were identified, enumerated and reported as colony-forming units per cubic meter (CFU/m^3).	
Outcome	Wheeze Persistent cough Rescue medication Asthma severity score	
Results		

	Wheeze	Persistent cough	Rescue medication use	Asthma severity score
Cladosporium >148 CFU/m^3	1.22 (0.66, 2.26)	0.98 (0.54, 1.80)	0.69 (0.37, 1.29)	1.58 (0.88, 2.83)
HDM Der p 1 >0.10 µg/g	1.26 (0.95, 1.67)	1.18 (0.90, 1.55)	1.47 (1.11, 1.94)	1.19 (0.92, 1.55)
HDM Der f 1 >2.1 µg/g	0.89 (0.63, 1.24)	0.90 (0.65, 1.25)	1.09 (0.78, 1.51)	1.28 (0.94, 1.74)
Fel d 1 >0.12 µg/g	1.39 (1.05, 1.84)	0.89 (0.68, 1.17)	1.32 (1.01, 1.74)	1.14 (0.88, 1.47)

Bibliographic reference	Gent JF, Kezik JM, Hill ME, et al (2012) Household mould and dust allergens: exposure, sensitization and childhood asthma morbidity. Environmental research 118, 86-93				
	Can f 1 >1.2 µg/g	1.53 (1.09, 2.15)	1.11 (0.80, 1.56)	1.15 (0.82, 1.62)	1.15 (0.83, 1.58)
Follow up	1 months				
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average child in the community Selection of the non-exposed cohort • no description of the derivation of the non-exposed cohort Ascertainment of exposure • Validated measurement used Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for gender, age, maintenance medication use, general atopic status, housing type, smoking, indoor NO_2 concentration, and season Outcome Assessment of outcome • self-report symptoms Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias: Moderate** (concern over self-report of outcomes)				
Source of funding	Government: National Institutes of Health:				
Comments					

D.1.38 Habre 2014

Bibliographic reference	Habre R, Moshier E, Castro W, et al (2014) The effects of $PM_{2.5}$ and its components from indoor and outdoor sources on cough and wheeze symptoms in asthmatic children. Journal of exposure science & environmental epidemiology 24(4), 380-7
Study design	Cohort
Objective	To investigate the association of indoor $PM_{2.5}$ of outdoor origin and its components with cough and wheeze symptom scores in asthmatic children

Bibliographic reference	**Habre R, Moshier E, Castro W, et al (2014) The effects of $PM_{2.5}$ and its components from indoor and outdoor sources on cough and wheeze symptoms in asthmatic children. Journal of exposure science & environmental epidemiology 24(4), 380-7**
Setting/Study location	United States
Number of participants	36
Selected population	Yes (focused on children with asthma)
Participant characteristics	Building characteristics: Location: Urban Dwelling type: Not reported Building age: Not reported Type of ownership/tenancy: Not reported Parental characteristics: Age (Mean & range): 10 years (6 – 15) Smoker in home: Not reported Race: Hispanic> 23 (64%) Black: 12 (36%) Selected: Asthma (36 (100%)
Inclusion criteria	Children aged 6–14 years, with doctor-diagnosed persistent moderate-to-severe asthma defined by at least one of the following: daily use of controller medication for at least 3 months over the past year, use of a b-agonist at least four times per month in any one of the past 3 months, or nocturnal awakenings twice a month in the past 3 months. Have slept at the household identified as the primary residence at least five times a week.
Exclusion criteria	More than 1 smoker in the household, family planning to move within the next 6 months, or no access to a phone. Presence of haematological, endocrine, or cardiac condition that required the use of daily medication, Presence of clotting disorder, Presence of severe mental disability that interfered with answering questions or following instructions.
Type of pollutant/exposure	Particulate matter 2.5
Pollutant/exposure assessment	A Multi-Pollutant Sampler (MPS) was placed in participants' living rooms.to collect 7-day integrated $PM_{2.5}$ samples on 37mm Teflon filters. $PM_{2.5}$ mass concentration was measured gravimetrically using standard methods. A Dustrak aerosol monitor (TSI, Model 8520) with a 2.5-mm inlet measured $PM_{2.5}$ mass concentrations at 10-min intervals. Biases in light-scattering devices have been previously described.20 Therefore, linear mixed effects models were used to calibrate the continuous Dustrak readings to weekly gravimetric $PM_{2.5}$ mass concentrations by fitting a random intercept and slope for each of the 13 Dustrak monitors used. After calibration, average daily indoor $PM_{2.5}$ mass concentrations were calculated starting at 0900 hours.
Outcome	Wheeze

Bibliographic reference	**Habre R, Moshier E, Castro W, et al (2014) The effects of $PM_{2.5}$ and its components from indoor and outdoor sources on cough and wheeze symptoms in asthmatic children. Journal of exposure science & environmental epidemiology 24(4), 380-7**	
	Cough Participants or their caretakers were asked to record their asthma cough and wheeze scores in a diary every day, with a score of zero equivalent to none, one as mild, two as moderate, and three as severe.	
Results	per SD increase $PM_{2.5}$ (Indoor) (SD=17.3) $PM_{2.5}$ (indoor sources) (SD=17.6) $PM_{2.5}$ (outdoor sources) (SD=61.) $PM_{2.5}$ (Indoor) $PM_{2.5}$ (indoor sources) $PM_{2.5}$ (outdoor sources)	aOR (95%CI) for cough 1.22 (0.91, 1.63) 1.20 (0.88, 1.64) 1.27 (0.90, 1.77) aOR (95%CI) for wheeze 1.57 (1.09, 2.26) 1.55 (1.05, 2.28) 1.13 (0.75, 1.72)
Follow up	2 years	
Newcastle-Ottawa Scale	Selection Representativeness of the exposed cohort • truly representative of the average child with asthma in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • secure record (objective sampling) Demonstration that outcome of interest was not present at start of study • No Comparability Comparability of cohorts on the basis of the design or analysis • study controls for O3 only Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall assessment: Moderate** (self-report of outcomes)	
Source of funding	**Industry**: (Electric Power Research Institute **Academic:** Harvard School of Public Health	
Comments		

D.1.39 Hagerhed-Engman 2009

Bibliographic reference	**Hagerhed-Engman L, Sigsgaard T, Samuelson I et.al (2009) Low home ventilation rate in combination with mouldy odor from the building structure increase the risk for allergic symptoms in children. Indoor air 19(3), 184-92**				
Study design	Nested case control				
Objective	To evaluate associations between doctor-diagnosed asthma and allergic diseases in pre-school children and moisture-related problems in the children's homes observed by professional inspectors				
Setting/Study location	Sweden				
Number of participants	400 children				
Selected population	No				
Participant characteristics	Description	Control		Cases	
		No.	%	No.	%
	Sex				
	Male	114	56.4	113	57.1
	Female	88	43.6	85	42.9
	Age (years)				
	2-4	74	36.6	77	38.9
	5-6	80	39.6	85	42.9
	7-8	48	23.8	36	18.2
	Ethnicity	Not reported		Not reported	
	Parental asthma and/or atopic				
	Atopic symptom in at least one parent	87	43.1	161	81.3
	Parental education	Not reported		Not reported	
	Annual family income	Not reported		Not reported	
	Building characteristics				
	Type of building				
	Single family house	172	85.1	161	81.3
	Row house	11	5.4	12	6.1
	Multi-family house	19	9.4	25	12.6
	Type of ventilation system				
	Natural	147	70.3	124	62.6
	Exhaust	37	18.3	56	28.3

Bibliographic reference	Hagerhed-Engman L, Sigsgaard T, Samuelson I et.al (2009) Low home ventilation rate in combination with mouldy odor from the building structure increase the risk for allergic symptoms in children. Indoor air 19(3), 184-92				
	Balanced	23	11.4	18	9.1
	Construction period				
	Before 1940	67	33.2	47	23.7
	1941-1960	35	17.3	37	18.7
	1961-1970	25	12.4	28	14.1
	1971-1983	44	21.8	63	31.8
	1984-present	31	15.3	23	11.6
Inclusion criteria	Inclusion criteria for cases Reports of at least two symptoms of either wheezing (without a cold), rhinitis (without a cold) or eczema Inclusion criteria for controls No symptoms For both groups, they had to: Agree to co-operate Not have rebuilt their homes because of moisture problems Not have changed residence since the first questionnaire				
Exclusion criteria	Not reported				
Type of pollutant/exposure	Dampness and mould				
Pollutant/exposure assessment	Blood samples were drawn and screened for sensitisation to common allergens and sensitised children were further tested for specific IgE (RAST) for cat, dog, horse, birch-, mugwort- and timothy grass pollen and mould. Samples of dust and air were collected in the children's bedroom and living room for analyses of chemical and biological compounds and measurements of ventilation rate, temperature and relative humidity were made. Each home scored on a three level scale for each index: grade 0 (no remarks), grade 1-2 (mild) and grade 3 (severe)				
Health outcome	Physician diagnosed asthma and allergic diseases (rhinitis and eczema)				
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between dampness indexes, asthma and allergic diseases				
		Asthma	Rhinitis	Eczema	
	Mould - Mild	1.30 (0.73, 2.29)	2.23 (1.17, 4.24)	1.86 (1.04, 3.30)	
	Mould - Severe	1.28 (0.60, 2.73)	2.45 (1.08, 5.54)	1.93 (0.91, 4.12)	
	Damp stains - Mild	0.86 (0.47, 1.60)	1.39 (0.73, 2.67)	0.64 (0.34, 1.20)	
	Damp stains - Severe	0.28 (0.5, 1.52)	0.37 (0.04, 3.43)	0.30 (0.06, 1.57)	
	Floor damp - Mild	0.82 (0.28, 2.42)	1.16 (0.36, 3.76)	0.78 (0.26, 2.34)	
	Floor damp - Severe	0.82 (0.05, 12.33)	1.58 (0.10, 26.14)	1.88 (0.20, 17.29)	
Follow up	12 months				

Bibliographic reference	**Hagerhed-Engman L, Sigsgaard T, Samuelson I et.al (2009) Low home ventilation rate in combination with mouldy odor from the building structure increase the risk for allergic symptoms in children. Indoor air 19(3), 184-92**
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average child in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • objective samples Demonstration that outcome of interest was not present at start of study Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for parental smoking • study controls for additional factors – age, gender, type of building, construction period and family history of asthma and allergy Outcome Assessment of outcome • independent blind assessment Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias: Low**
Source of funding	Study supported by the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas), Swedish Asthma and Allergy Association's research Foundation, the Swedish Foundation for Health Care Sciences and Allergy Research, SP Technical Research Institute of Sweden
Comments	Authors suggest that study support the hypothesis that odour from microbiological and/or chemical degradation of building material can be transported into the indoor environment and increase the risk for allergic symptoms among children as well as sensitization.

D.1.40 Hagmolen of Ten Have 2007

Bibliographic reference	**Hagmolen of Ten Have W, van den Berg NJ, van der Palen J et al (2007) Residential exposure to mould and dampness is associated with adverse respiratory health. Clinical and experimental allergy: journal of the British Society for Allergy and Clinical Immunology 37(12), 1827-32**	
Study design	Prospective cohort study	
Objective	to investigate the association of reported exposure to mould and dampness and respiratory health in a general practice-based population of asthmatic children	
Setting/Study location	Netherlands	
Number of participants	526 children	
Selected population	Yes - all had asthma	
Participant characteristics	Description	
	Sex	
	Female	240 (45.6%)
	Age (years)- Mean (SD)	11 (2.5)
	Ethnicity	Not reported
	Education	
	Parental less than 11 years education	70 (13.3%)
	Annual family income	Not reported
Inclusion criteria	If at least two prescriptions of b2-mimetics or an inhaled corticosteroid (ICS) were prescribed in the year before invitation	
Exclusion criteria	FEV1 was<75% predicted.	
Type of pollutant/exposure	Dampness Pets	
Pollutant/exposure assessment	Questionnaire	
Outcome	Risk of airway hyper-responsiveness	
		aOR (95%CI)
	Mould and dampness, living or child's sleeping room	3.95 (1.82, 8.57)
	Pet ownership	1.17 (0.70, 1.94)
Follow up	2 weeks	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • selected group of children with asthma Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • written self-report Demonstration that outcome of interest was not present at start of study • No Comparability Comparability of cohorts on the basis of the design or analysis	

Bibliographic reference	**Hagmolen of Ten Have W, van den Berg NJ, van der Palen J et al (2007) Residential exposure to mould and dampness is associated with adverse respiratory health. Clinical and experimental allergy: journal of the British Society for Allergy and Clinical Immunology 37(12), 1827-32**
Study design	Prospective cohort study
	• study controls for smoking status • study controls for any additional factors as follows - gender, history of inhalant allergy, history of rhinitis, family history of asthma, the level of parental education, pet ownership, and use of ICS in the previous 4 months, season of study assessment, health care centre, exposure to environmental smoking by parents or household members Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall level of bias: High** (concerns over self-reporting of outcome and exposure)
Source of funding	**Industry:** GlaxoSmithKline
Comments	

D.1.41 Harris 2007

Bibliographic reference	**Harris J M, Williams H C, White C, et al (2007) Early allergen exposure and atopic eczema. The British journal of dermatology 156(4), 698-704**	
Study design	Prospective cohort study	
Objective	To analyse allergen exposure and eczema outcomes measured up to age 8 years,	
Setting/Study location	United Kingdom	
Number of participants	593 children	
Selected population	No	
Participant characteristics	Description Sex Maternal age (years) Ethnicity Maternal asthma and/or atopic SES	 Not reported Not reported Not reported Not reported Not reported
Inclusion criteria	Not reported	
Exclusion criteria	Not reported	

Bibliographic reference	**Harris J M, Williams H C, White C, et al (2007) Early allergen exposure and atopic eczema. The British journal of dermatology 156(4), 698-704**		
Type of pollutant/exposure	Dust mite and cat allergen exposure		
Pollutant/exposure assessment	Dust samples were collected from the living room floor 8 weeks after birth. These samples were assayed for concentrations of house dust mite and cat allergen using standard techniques.		
Outcome	Eczema		
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs)		
		Eczema	Visible flexural dermatitis
		aOR (95%CI)	aOR (95%CI)
	Quintile of house dust mite exposure (units not reported)		
	1 (lowest) (0.02 to 0.27)	1.00	1.00
	2 (0.28 to 0.81)	1.01 (0.53, 1.92)	1.17 (0.58, 2.34)
	3 (0.82 to 2.22)	1.37 (0.74, 2.55)	1.73 (0.87, 3.46)
	4 (2.23 to 7.75)	0.66 (0.34, 1.29)	0.88 (0.43, 1.81)
	5 (highest) (7.76 to 384.97)	0.71 (0.37, 1.37)	0.96 (0.47, 1.94)
	Quintile of cat allergen exposure (units not reported)		
	1 (lowest) (0.01 to 0.44)	1.00	1.00
	2 (0.45 to 1.04)	1.42 (0.72, 2.81)	1.28 (0.64, 2.56)
	3 (1.05 to 3.33)	1.41 (0.71, 2.79)	0.75 (0.36, 1.55)
	4 (3.34 to 44.72)	1.31 (0.65, 2.62)	1.18 (0.59, 2.38)
	5 (highest) (44.73 to 14,151.32)	1.41 (0.72, 2.75)	0.96 (0.48, 1.91)
Follow up	8 years		
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the child in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • Objective measurement Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for all variables Outcome Assessment of outcome • Clinical diagnosis Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias: Low**		

Bibliographic reference	Harris J M, Williams H C, White C, et al (2007) Early allergen exposure and atopic eczema. The British journal of dermatology 156(4), 698-704
Source of funding	**Charity:** The Colt foundation
Comments	

D.1.42 Hunt 2011

Bibliographic reference	Hunt A, Crawford JA, Rosenbaum P F, et al (2011) Levels of household particulate matter and environmental tobacco smoke exposure in the first year of life for a cohort at risk for asthma in urban Syracuse, NY. Environment International 37(7), 1196-205
Study design	Birth cohort
Objective	To investigate possible associations between indoor exposures and infant health status (in particular wheezing)
Setting/Study location	United States
Selected population	Yes (selected on based of being at risk of asthma)
Number of participants	103 mother baby-dyads
Participant characteristics	Building characteristics: Location: urban Dwelling type: Not reported Building age: Not reported Type of ownership/tenancy: Not reported Parental characteristics: Age: Not reported Current smoker (mother): 55 (54%) Hay fever: Not reported Atopy: Not reported but all mothers had asthma
Inclusion criteria	Documented history of maternal asthma Expectation of the mother residing in same residence for at least 1 year or an adjacent urban location Infant criteria Gestational age ≥ 37 weeks Birthweight ≥ 2500 g Absence of any major congenital abnormality Singleton birth
Exclusion criteria	None reported
Type of pollutant/exposure	Particulate matter 2.5 ≥15µg/m^3
Pollutant/exposure assessment	Particulate matter was collected using size selective Harvard impactors operating at 10 L/min placed in the living room
Outcome	Wheeze defined as Primary-care provided-documented wheezing, reactive airway disease, asthma or bronchiolitis or

Bibliographic reference	**Hunt A, Crawford JA, Rosenbaum P F, et al (2011) Levels of household particulate matter and environmental tobacco smoke exposure in the first year of life for a cohort at risk for asthma in urban Syracuse, NY. Environment International 37(7), 1196-205**
	Wheeze heard on physical examination by the nurse practitioner or A prescription for bronchodilator, inhaled steroid or steroid pulse prescription document in the medical records
Results	Wheeze PM 2.5 ≥15µg/m^3=aOR 4.21 (1.36, 13.03)
Follow up	12 months
Newcastle-Ottawa Scale	Selection Representativeness of the exposed cohort • truly representative of the average infant in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • secure record of objective measurement Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for gender, maternal age and education, season of home visit and presence of carpeting Outcome Assessment of outcome • independent blind assessment or medical records Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall assessment:** Low
Source of funding	**Government:** Research grant (USEPA)
Comments	Particulate matter was primarily sourced from environmental tobacco smoke

D.1.43 Hart 2014

Bibliographic reference	**Hart JE, Chiuve S E, Laden F, et al (2014) Roadway proximity and risk of sudden cardiac death in women. Circulation 130(17), 1474-82**
Study design	Prospective cohort study
Objective	To determine whether roadway proximity was associated with an increased risk of Sudden Cardiac Death (SCD)
Setting/Study location	United States

Bibliographic reference	**Hart JE, Chiuve S E, Laden F, et al (2014) Roadway proximity and risk of sudden cardiac death in women. Circulation 130(17), 1474-82**		
Number of participants	107130 women		
Participant characteristics	Description	No.	%
	Sex	Not reported	Not reported
	Age (years); mean (SD)	64.3 (10.0)	
	Ethnicity		
	White	100702	94
	Black	2143	2
	Other/multiple	5356	5
	(Maintenance) medication use		
	Aspirin use		
	<1 times/week	61064	57
	1–6 times/week	19283	18
	≥7 times/week	10713	10
	Maternal asthma and/or atopic	Not reported	Not reported
	Parental history of MI		
	None	79276	74
	Before 60 years of age	12855	12
	After 60 years of age	16070	15
	Parental education	Not reported	Not reported
	Annual family income	Not reported	Not reported
	Building characteristics	Not reported	Not reported
Inclusion criteria	Women were included in the present study if they were still responding to questionnaires Had at least 1 home address that was geocoded to the street-segment level No cancer (other than non-melanoma skin cancer) No cardiovascular disease		
Exclusion criteria	No reported		
Type of pollutant/exposure	Proximity to traffic		
Pollutant/exposure assessment	Authors calculated roadway proximity at each mailing address as a proxy for traffic exposure. Distance (in meters) was determined with the Geographical Information System software (ArcGIS 10.2, ESRI, Redlands, CA). ESRI StreetMap Pro 2007 road segments were selected to include the 3 largest US Census Feature Class Codes: A1, primary roads, typically interstate highways, with limited access, division between the opposing directions of traffic, and defined exits; A2, primary major, non-interstate highways and major roads without access restrictions; or A3, smaller, secondary roads, usually with >2 lanes)		
Outcome	Sudden Cardiac Death (SCD)		
Results	Adjusted hazard ratios (aHRs) and 95% confidence intervals (CIs) for association between proximity to traffic and Sudden Cardiac Death		

Bibliographic reference	**Hart JE, Chiuve S E, Laden F, et al (2014) Roadway proximity and risk of sudden cardiac death in women. Circulation 130(17), 1474-82**	
		Sudden Cardiac Death
	Distance	aHRs (95%CI)
	0–49	1.38 (1.04, 1.82)
	50–199	1.17 (0.91, 1.51)
	200–499	1.20 (0.93, 1.53)
	≥500	Reference
Follow up	Over 26 years of follow-up	
Study methods	On all questionnaires, authors inquire about the occurrence of physician diagnosed coronary heart disease (CHD) events, and deaths are identified by reports from next-of-kin or postal authorities or by searches of the National Death Index. SCDs were confirmed by physician review of medical records and next-of-kin reports on the circumstances surrounding the death if not adequately documented in the medical record. Cardiac deaths were considered sudden if the death or cardiac arrest occurred within 1 hour of the onset of symptoms. Time-varying Cox proportional hazards models were used to assess the relationship of outcome with roadway proximity. All models were based on a biennial time scale and were stratified by age in months and time-period.	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average female population in the community Selection of the non-exposed cohort • no description of the derivation of the non-exposed cohort Ascertainment of exposure • validated measurements used Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for age, race, comorbidities: incidence of high cholesterol, high blood pressure, stroke, or coronary heart disease Outcome Assessment of outcome • Physician diagnosed Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • no statements **Overall risk of bias: low**	
Source of funding	**Government:** National Institutes of Health **Charity;** American Heart Association	
Comments	Authors reported that measure of exposure, roadway proximity, is a poor proxy for true traffic exposures such as noise or pollution levels, and it does not provide us with information on temporal changes in exposures that may be associated with triggering of events. These are expected to lead to non-differential misclassifications of exposure, which would bias our results toward the null.	

D.1.44 Harville 2018

Bibliographic reference	**Harville EW, Rabito FA. (2018) Housing conditions and birth outcomes: The National Child Development Study.**
Study design	Prospective cohort study
Objective	To examine if there is an association between poor housing/living conditions and undesirable birth outcomes
Setting/Study location	Unspecified locations in the UK
Number of dwellings and participants	Number of dwellings: 1,927 homes Number of participants: 1,927 women
Selected population	No
Building and Participant characteristics	Building characteristics: Location: not reported Dwelling type: detached, 22.3%; semi-detached, 70.7%; apartment or room, 6.2%; caravan/houseboat/mobile home, 0.7% Building age: not reported Type of ownership/tenancy: rented, 15%; owned, 85% Double glazing: 32.3% Central heating: 26.2% Participant characteristics: Age at included pregnancy: <24 years, 4.4%; 25-28 years, 18.7%; 29-30 years, 18.6%; >30 years, 58.2% Smoking during pregnancy: 29.1% BMI at age 33: <20, 10%; 20-24, 53.6%; 25-29, 24.7%; ≥30, 11.7%
Inclusion criteria	Women participating in a national birth cohort study who had given birth at least once while living in their current property were included. If they reported more than 1 birth, outcomes of the latest one were used.
Exclusion criteria	Not reported
Building factor/exposure	Location and severity of mould
Building factor/exposure assessment	Building factors were ascertained by asking participants to complete a self-reported questionnaire.
Outcome	Low birth weight, preterm birth, small for gestational age
Results	

	Odds ratio (95%CI)		
Building characteristic	Low birthweight	Preterm birth	Small for gestational age
Mould			
Mould anywhere	1.98 (1.13, 3.47)	1.23 (0.69, 2.19)	2.06 (1.25, 3.38)
Serious mould anywhere	2.42 (1.20, 4.86)	1.60 (0.79, 3.23)	1.89 (0.96, 3.71)
Mould in bedroom	1.87 (0.68, 5.15)	2.23 (0.94, 5.28)	1.35 (0.53, 3.43)
Mould in kitchen	2.24 (0.75, 6.66)	0.82 (0.19, 3.52)	1.04 (0.30, 3.58)

Bibliographic reference	**Harville EW, Rabito FA. (2018) Housing conditions and birth outcomes: The National Child Development Study.**			
	Serious mould in bedroom	1.47 (0.33, 6.61)	1.82 (0.52, 6.36)	0.85 (0.19, 3.86)
	Serious mould in kitchen	2.25 (0.65, 7.74)	1.12 (0.26, 4.83)	0.48 (0.06, 3.63)
	Renovations			
	Against damp	1.04 (0.52, 2.11)	0.32 (0.11, 0.89)	1.28 (0.69, 2.35)
	Roof	0.80 (0.42, 1.52)	0.25 (0.10, 0.62)	0.97 (0.55, 1.70)
	Gutter	1.15 (0.65, 2.04)	0.55 (0.29, 1.04)	1.08 (0.64, 1.82)
	Point	1.30 (0.67, 2.51)	0.89 (0.45, 1.77)	1.26 (0.68, 2.33)
	Glazing	0.96 (0.57, 1.64)	0.86 (0.52, 1.41)	1.03 (0.64, 1.66)
	Heating	1.25 (0.73, 2.13)	1.15 (0.70, 1.90)	1.27 (0.78, 2.05)
	Garage	1.44 (0.60, 3.48)	1.59 (0.74, 3.43)	1.09 (0.45, 2.60)
	Extension	1.20 (0.67, 2.17)	0.94 (0.53, 1.68)	0.94 (0.54, 1.65)
	Loft	1.88 (0.65, 5.47)	1.34 (0.47, 3.84)	1.02 (0.31, 3.37)
	Wiring	1.01 (0.57, 1.79)	0.81 (0.49, 1.41)	1.07 (0.64, 1.80)
	Plumbing	1.38 (0.78, 2.44)	0.96 (0.55, 1.67)	1.02 (0.59, 1.78)
Follow up	33 years			
Study methods	Methods: Children born during the week of March 1958 were included in a national child development cohort study. Of these participants, 33-year follow-up data were obtained from all women who had given birth at least once and were living in the same property. Exposure data were taken from a self-reported questionnaire in which participants provided information on residential history, renovations and housing conditions; namely, presence and severity of mould. Participants were then asked if they had been pregnant, estimated due date, the gestational age and the birthweight of the baby. Statistical analysis; multivariate logistic regression			
Newcastle-Ottawa Scale	Selection Representativeness of the exposed cohort • selected group – women who were participating in a birth cohort study Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • Self-reported Demonstration that outcome of interest was not present at start of study			

Bibliographic reference	Harville EW, Rabito FA. (2018) Housing conditions and birth outcomes: The National Child Development Study.
	• Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for BMI, education, social class, age, smoking, home ownership, housing type, number of residents, year of birth and time in the house Outcome Assessment of outcome • Self-reported Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts complete follow up - all subjects accounted for **Overall risk of bias: moderate** (Concerns over self-report of exposure an outcomes)
Source of funding	Authors reported that no external funding was provided for this study
Comments	

D.1.45 Heinrich 2013

Bibliographic reference	Heinrich J, Thiering E, Rzehak P, et al (2013) Long-term exposure to NO_2 and PM_{10} and all-cause and cause-specific mortality in a prospective cohort of women. Occupational and environmental medicine 70(3), 179-86		
Study design	Prospective cohort study		
Objective	To assess whether long-term exposure to air pollution is associated with all-cause and cause-specific mortality during a period of declining particulate matter concentrations.		
Setting/Study location	Germany		
Number of participants	4800 women		
Selected population	No		
Participant characteristics	Description	No.	%
	Sex	Not reported	Not reported
	Maternal age (years)	Not reported	Not reported
	Ethnicity	Not reported	Not reported
	(Maintenance) medication use	Not reported	Not reported
	Maternal asthma and/or atopic	Not reported	Not reported
	SES		
	Parental education	Not reported	Not reported
	Annual family income	Not reported	Not reported

Bibliographic reference	**Heinrich J, Thiering E, Rzehak P, et al (2013) Long-term exposure to NO_2 and PM_{10} and all-cause and cause-specific mortality in a prospective cohort of women. Occupational and environmental medicine 70(3), 179-86**			
	Building characteristics	Not reported	Not reported	
Inclusion criteria	Not reported			
Exclusion criteria	Not reported			
Type of pollutant/exposure	Particulate matter (PM), NO_2 and proximity to the major road			
Pollutant/exposure assessment	Authors used NO_2 and PM_{10} derived from total suspended particulate matter (TSP) as surrogates for air pollution. NO_2 concentrations were measured by means of chemiluminescence, and TSP levels were measured at state routine monitoring sites by β absorption. PM_{10} was calculated as 0.71×TSP for all monitoring sites. The factor of 0.71 was derived from parallel measurements of PM_{10} and TSP at seven monitoring sites in the study area			
Outcome	All-cause, Cardiopulmonary, Lung cancer, Respiratory			
Results	Adjusted odds ratios (aRRs) and 95% confidence intervals (CIs) for association between all-cause, cardiopulmonary and lung cancer mortality, and an IQR increase in air pollution concentrations and distance to roads with >10 000 cars/day			
		All-cause	Cardiopulmonary	Lung cancer	Respiratory
		aRR (95%CI)	aRR (95%CI)	aRR (95%CI)	aRR (95%CI)
	Distance from home to a major road				
	>50 m	1.00	1.00	1.00	1.00
	≤50 m	1.42 (1.12, 1.79)	1.95 (1.37, 2.77)	0.62 (0.15, 2.60)	3.54 (1.49, 8.40)
	1-year average				
	NO_2	1.18 (1.07, 1.30)	1.55 (1.30, 1.84)	1.46 (0.92, 2.32)	1.13 (0.71, 1.80)
	PM_{10}	1.15 (1.04, 1.27)	1.39 (1.17, 1.64)	1.84 (1.23, 2.74)	0.96 (0.60, 1.53)
Follow up	21.9 years				
Study methods	Associations between mortality and exposure were analysed using Cox's proportional hazards models including adjustment for potential confounders. For participants who passed away, the time in the study was calculated as the difference between the date of the baseline cross-sectional study and the date of fatality. For those alive at the end of follow-up, the time in the study was calculated as the difference between the start and end of follow-up. For participants who moved during follow-up and were subsequently lost, the time in the study was calculated as the difference between the start of follow-up and the last date when the vital status and place of residence were known.				
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average female population in the community Selection of the non-exposed cohort				

Bibliographic reference	Heinrich J, Thiering E, Rzehak P, et al (2013) Long-term exposure to NO_2 and PM_{10} and all-cause and cause-specific mortality in a prospective cohort of women. Occupational and environmental medicine 70(3), 179-86
	• no description of the derivation of the non-exposed cohort Ascertainment of exposure • validated measurement used Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for age, educational level and smoking status Outcome Assessment of outcome • record linkage and death certificates Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • no statements **Overall risk of bias: low**
Source of funding	**Government:** North Rhine-Westphalia State Environment Agency (LANUV-NRW) of the Ministry of the Environment and Conservation, Agriculture and Consumer Protection North Rhine-Westphalia (MUNLV), Dusseldorf, Germany.
Comments	

D.1.46 Henderson 2008

Bibliographic reference	Henderson J, Sherriff A, Farrow A, et al (2008) Household chemicals, persistent wheezing and lung function: Effect modification by atopy? European Respiratory Journal 31(3), 547-554		
Study design	Prospective cohort study		
Objective	To investigate the effects of maternal chemical use during pregnancy on wheezing patterns in children whether increasing use is associated with decrements in lung function at age 8.5 yrs.; and 3) whether atopy modifies these associations		
Setting/Study location	United Kingdom		
Number of participants	14,541 pregnant women		
Selected population	No		
Participant characteristics	Description		
	Sex	3711	3451
	Age (years) (reported as maternal)		
	< 25 years	521 (14.0%)	539 (15.6%)
	≥25 years	3190 (86.0)	2912 (84.4)
	Ethnicity	Not reported	Not reported
	Education		

Bibliographic reference	Henderson J, Sherriff A, Farrow A, et al (2008) Household chemicals, persistent wheezing and lung function: Effect modification by atopy? European Respiratory Journal 31(3), 547-554		
	None/CSE Vocational O-level A-level Degree Annual family income	487 (13.3%) 315 (8.6%) 1325 (36.3%) 938 (25.7%) 590 (16.1%) Not reported	464 (13.6%) 281 (8.3%) 1194 (35.1%) 902 (26.5%) 563 (16.45%) Not reported
Inclusion criteria	Expected date of delivery between April 1, 1991 and December 31, 1992 Place of residence within the three Bristol-based health districts of the former county of Avon, UK		
Exclusion criteria	Not reported		
Type of pollutant/exposure	Composite household chemical exposure – VOCs and non VOCs containing chemicals		
Pollutant/exposure assessment	Questionnaire		
Outcome	early-onset transient wheeze, i.e. wheezed at 0–18 months but not at 69–81 months intermediate-onset transient wheeze, i.e. no wheeze at 0–18 months and wheeze at 18–42 months and no wheeze at 69–81 months; early-onset persistent wheeze, i.e. wheeze at 0–18 and 69–81 months; intermediate onset persistent wheeze, i.e.no wheeze at 0–18 months and wheeze at 18–42 and 69–81 months late onset wheeze, i.e. onset of wheeze after 42 months and before 81 months		
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between Composite Household Chemical Exposure and wheezing		
		Composite Household Chemical Exposure	
		aOR (95%CI)	
	Early-onset transient wheeze Early onset persistent wheeze Intermediate-onset transient wheeze Intermediate-onset persistent wheeze Late onset wheeze	1.07 (0.99–1.14) 1.21 (1.08–1.38) 1.13 (1.01–1.28) 1.11 (0.91–1.36) 1.07 (0.88–1.29)	
Follow up	81 months		
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average pregnant woman in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • questionnaire Demonstration that outcome of interest was not present at start of study • Yes		

Bibliographic reference	Henderson J, Sherriff A, Farrow A, et al (2008) Household chemicals, persistent wheezing and lung function: Effect modification by atopy? European Respiratory Journal 31(3), 547-554
	Comparability Comparability of cohorts on the basis of the design or analysis • study controls for exposure to environmental tobacco smoke • study controls for additional factors - overcrowding in home, highest maternal education level, housing tenure, sex, maternal history of asthma, maternal parity, maternal age at delivery, smoking during pregnancy, month of completion of chemicals questionnaire and maternal hours worked outside home Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • subjects lost to follow up unlikely to introduce bias - description provided of those lost **Overall risk of bias: High** (concerns over self-report of exposure and outcomes)
Source of funding	**Government:** The UK Medical Research Council, **Charity:** the Wellcome Trust UK **Academic:** University of Bristol
Comments	The composite household chemical exposure (CHCE) comprises of 11 different products (disinfectant; bleach; carpet cleaner; window cleaner; dry cleaning fluid; aerosols, turpentine/white spirit, air fresheners (spray, stick or aerosol); paint stripper; paint or varnish; and pesticides/insect killers). A simple score for frequency of use of each product was derived: 0 for not at all; 1 for less than once a week; 2 for about once a week; 3 for most days; and 4 for every day. The scores for each product were summed to produce a composite household chemical exposure (CHCE) score for each respondent

D.1.47 Herr 2011

Bibliographic reference	Herr M, Nikasinovic L, Foucault C, et al (2011) Can early household exposure influence the development of rhinitis symptoms in infancy? Findings from the PARIS birth cohort. Annals of Allergy, and Asthma and Immunology 107(4), 303-309
Study design	Prospective cohort
Objective	To investigate risk factors for rhinitis symptoms in infants
Setting/Study location	France
Number of participants	1850 infants
Selected population	No
	Individual characteristics

Bibliographic reference	**Herr M, Nikasinovic L, Foucault C, et al (2011) Can early household exposure influence the development of rhinitis symptoms in infancy? Findings from the PARIS birth cohort. Annals of Allergy, and Asthma and Immunology 107(4), 303-309**		
Participant characteristics	Age (months – Mean (SD)		19 (2)
	Sex, n (%) Male		 925 (50)
	Race / ethnicity		Not reported
	SES, n (%) High Intermediate Low		 1231 (66.5) 476 (25.7) 143 (7.7)
	Building characteristics		
	Apartment, %		92
	Gas cooking or heating, n (%)		1,031(56.4)
	Indoor renovation activities in the home in the past year Indoor renovation activities in the child's bedroom in the past year Presence of particle-board furniture less than 1 year old in the home Presence of particle-board furniture less than 1 year old in the child's bedroom Presence of moulds in the home Use of an air dampener Carpet in the bedroom of the child New mattress in the baby's bedding Use of an anti-dust mite cover in the baby's bedding		780 (42.7%) 686 (37.5%) 784 (42.9%) 540 (29.5%) 332 (18.2%) 300 (16.4%) 761 (41.6%) 968 (52.9%) 636 (35.0%)
Inclusion criteria	Infants included in the PARIS birth cohort		
Exclusion criteria	Not reported		
Type of pollutant / exposure	VOCs		
Pollutant / exposure assessment	Not reported		
Outcome	Rhinitis symptoms in last 12 months		
Results	Adjusted Odds Ratio and 95% Confidence Intervals		
		Allergic rhinitis	Non-allergic Rhinitis
	Presence of particle board less than 1 year old in child's room	1.09 (0.63, 1.87)	1.87 (1.21, 2.90)
Follow up	18 months		
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average infant in the community		

Bibliographic reference	**Herr M, Nikasinovic L, Foucault C, et al (2011) Can early household exposure influence the development of rhinitis symptoms in infancy? Findings from the PARIS birth cohort. Annals of Allergy, and Asthma and Immunology 107(4), 303-309**
	Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • no description Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for environmental tobacco smoke • study controls for additional factors including sex, socioeconomic status, duration of maternal breastfeeding and presence of siblings Outcome Assessment of outcome • self-report (parent) Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias: High** (concerns over self- report of exposure and outcomes)
Source of funding	**Government:** Social, Childhood and Health Direction (DASES) of the Paris Council; **Academic:** Paris Descartes University; **Industry:** French Health Insurance System; Biochemistry Laboratory of the Groupe Hospitalier Trousseau-La Roche Guyon, Assistance Publique–Hôpitaux de Paris.
Comments	Allergic rhinitis was defined as the combination of rhinitis symptoms with an atopic status. Non-allergic rhinitis was defined as the occurrence of rhinitis symptoms in the absence of an atopic status

D.1.48 Herr 2012

Bibliographic reference	**Herr M, Just J, Nikasinovic L et.al (2012) Influence of host and environmental factors on wheezing severity in infants: findings from the PARIS birth cohort. Clinical and experimental allergy: journal of the British Society for Allergy and Clinical Immunology 42(2), 275-83**
Study design	Prospective cohort study
Objective	To investigate host and environmental risk factors for the occurrence of wheeze during the first 18 months of life

Bibliographic reference	**Herr M, Just J, Nikasinovic L et.al (2012) Influence of host and environmental factors on wheezing severity in infants: findings from the PARIS birth cohort. Clinical and experimental allergy: journal of the British Society for Allergy and Clinical Immunology 42(2), 275-83**		
Setting/Study location	France		
Number of participants	1879 infants		
Selected population	No		
Participant characteristics	Description	No.	%
	Sex		
	Male	938	49.4
	Female	941	50.1
	Maternal age (years)	Not reported	Not reported
	Ethnicity	Not reported	Not reported
	(Maintenance) medication use	Not reported	Not reported
	Parental asthma and/or atopic	348	18.5
	Parental education	Not reported	Not reported
	Annual family income	Not reported	Not reported
	Building characteristics	Not reported	Not reported
Inclusion criteria	Not reported		
Exclusion criteria	Not reported		
Type of pollutant/exposure	Presence of furred pet House dust mite from cleaning habits, carpeted covered floor, age of the bedding and use of anti-dust mite cover on the mattress		
Pollutant/exposure assessment	House dust mite, pets, and mould was analysed using ImmunoCAP Phadiap and Trophatop fx26, fx27 and fx28 with a detection limit set at 0.35 U/mL. Sensitised infant were further investigated to identify the allergen(s) involved.		
Outcome	Wheeze – that required inhaled corticosteroids and/or hospital based care		
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between host and environmental risk factors for wheeze in the first 18 months of life		
		Wheeze	
		OR (95%CI)	
	Renovation activities after birth	1.22 (0.96, 1.54)	
	Presence of a cat in the home	0.65 (0.47, 0.89)	
	House dust mite from carpeted covered floor	1.39 (1.12, 1.73)	
	Daily use of cleaning spray	1.50 (0.97, 2.32)	
Follow up	18 months		

Bibliographic reference	**Herr M, Just J, Nikasinovic L et.al (2012) Influence of host and environmental factors on wheezing severity in infants: findings from the PARIS birth cohort. Clinical and experimental allergy: journal of the British Society for Allergy and Clinical Immunology 42(2), 275-83**
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average child in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • objective sample Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for Prenatal exposure to tobacco smoke • study controls for any additional factor birth weight, socioeconomic status, duration of maternal exclusive breastfeeding and presence of mould and cockroaches in the home Outcome Assessment of outcome • record linkage Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias – Low**
Source of funding	**Government:** Social, Childhood and Health Direction (DASES) of the Paris Council.
Comments	

D.1.49 Hjortebjerg 2012

Bibliographic reference	**Hjortebjerg D, Andersen A N, Garne E et.al (2012) Non-occupational exposure to paint fumes during pregnancy and risk of congenital anomalies: a cohort study. Environmental health: a global access science source 11, 54**
Study design	Prospective cohort study
Objective	to investigate the association between exposure to paint fumes in the residence during the 1st trimester of pregnancy and the risk of congenital anomalies in a prospective cohort
Setting/Study location	Denmark
Number of participants	20103 pregnant women
Selected population	No

Bibliographic reference	**Hjortebjerg D, Andersen A N, Garne E et.al (2012) Non-occupational exposure to paint fumes during pregnancy and risk of congenital anomalies: a cohort study. Environmental health: a global access science source 11, 54**		
Participant characteristics	Description	Exposed (n=1404)	Non-exposed (n=18531)
	Sex		
	o Female	1404 (100%)	18531 (100%)
	Age (years) reported as maternal age – Mean (SD)	29.2 (4.2%)	29.3 (4.3%)
	Ethnicity	Not reported	Not reported
	Education	Not reported	Not reported
	SES	Not reported	Not reported
	Building characteristics	Not reported	Not reported
Inclusion criteria	Able to speak Danish Pregnant and intended to carry the pregnancy to term		
Exclusion criteria	birth of stillborns women whose children had a diagnosis of chromosomal abnormalities incomplete information on covariates and not the main exposure of interest, paint fumes.		
Type of pollutant/exposure	Volatile organic compounds (VOC) – paint fumes in 1st trimester		
Pollutant/exposure assessment	Interview		
Outcome	Congenital anomalies (via National Hospital Discharge Registry)		
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between paint fumes in the residence during 1st trimester of pregnancy and congenital anomalies		
		All congenital malformations	
		aOR (95%CI)	
	All congenital malformations	0.95 (0.74, 1.21)	
	Nervous system	2.19 (0.76, 6.32)	
	Eye	1.79 (0.70, 4.57)	
	Ear, face and neck	2.15 (0.84, 5.55)	
	Congenital heart defects	0.76 (0.39, 1.49)	
	Respiratory system	1.13 (0.27-4.79)	
	Cleft lip and cleft palate	1.06 (0.33, 3.46)	
	Digestive system	0.61 (0.15, 2.50)	
	Abdominal wall defects	NA	
	Renal	2.16 (1.02-4.58)	
	Genital	0.83 (0.48-1.43)	
	Limb defects	0.82 (0.54-1.24)	
	Muscula and skeletal	1.77 (0.75-4.16)	
	Other malformation	1.24 (0.62-2.46)	
Follow up	6 months		

Bibliographic reference	Hjortebjerg D, Andersen A N, Garne E et.al (2012) Non-occupational exposure to paint fumes during pregnancy and risk of congenital anomalies: a cohort study. Environmental health: a global access science source 11, 54
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average pregnant woman in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort □ Ascertainment of exposure • structured interview Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for working with organic solvents at first interview (12th week) • study controls for any additional factors - Maternal age, smoking during 1st trimester, alcohol consumption during 1st trimester, Outcome Assessment of outcome • record linkage Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • subjects lost to follow up unlikely to introduce bias - or description provided of those lost) □ **Overall risk of bias: Low**
Source of funding	**Charity:** The Danish National Research Foundation; Pharmacy Foundation, the Egmont Foundation, the March of Dimes Birth Defects Foundation, the Augustinus Foundation, and the Health Foundation.
Comments	

D.1.50 Hoffmann 2007

Bibliographic reference	Hoffmann B, Moebus S, Mohlenkamp S, et al (2007) Residential exposure to traffic is associated with coronary atherosclerosis. Circulation 116(5), 489-96
Study design	Prospective cohort study
Objective	To investigate the association of long-term residential traffic exposure and $PM_{2.5}$ exposure with the degree of coronary atherosclerosis in a population-based cohort in Germany
Setting/Study location	Germany
Number of participants	4494 adults

Bibliographic reference	**Hoffmann B, Moebus S, Mohlenkamp S, et al (2007) Residential exposure to traffic is associated with coronary atherosclerosis. Circulation 116(5), 489-96**		
Selected population	No		
Participant characteristics	Description	No.	%
	Sex (male)	2206	49.1
	Age (years); mean (SD)	60.2 (7.8)	-
	Ethnicity	Not reported	Not reported
	(Maintenance) medication use	Not reported	Not reported
	Maternal asthma and/or atopic	Not reported	Not reported
	Parental education		
	Low	2491	55.4
	Medium	1249	27.8
	High	754	16.8
	Household income		
	<3000 €/month	1554	36.8
	3000 to 5999 €/month	1628	38.6
	≥ 6000 €/month	1041	24.7
	Building characteristics	Not reported	Not reported
Inclusion criteria	Not reported		
Exclusion criteria	Not reported		
Type of pollutant/exposure	Proximity to traffic		
Pollutant/exposure assessment	Daily mean values for $PM_{2.5}$ (midpoint of the baseline examination) on a grid of 5 km were estimated with the EURAD dispersion model using input data from official emission inventories, meteorological information, and regional topographical data. The model was validated by comparing the daily model-derived values with measured air pollution data from monitoring sites, showing very good agreement		
Outcome	coronary artery calcification (CAC)		
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between proximity to traffic, $PM_{2.5}$ and coronary artery calcification (CAC)		
		High Traffic Exposure (≤100 m)	
		aOR (95%CI)	
	Coronary artery calcification (CAC)	1.45 (1.15, 1.82)	
Follow up	Not reported		
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average population in the community		

Bibliographic reference	**Hoffmann B, Moebus S, Mohlenkamp S, et al (2007) Residential exposure to traffic is associated with coronary atherosclerosis. Circulation 116(5), 489-96**
	Selection of the non-exposed cohort • no description of the derivation of the non-exposed cohort Ascertainment of exposure • validated measurement used Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • Study controls for city, area of residence, age, sex, education, smoking, ETS, physical inactivity, waist-to-hip ratio, diabetes, blood pressure, and lipids. Outcome Assessment of outcome • medical examination/investigation of CAC Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • no statement **Overall risk of bias: low**
Source of funding	**Charity:** Heinz Nixdorf Stiftung
Comments	Authors reported that a lack of a residential history is a limitation to the study. Relocations, a change in traffic patterns, and a change in other anthropogenic emissions (industry, heating with fossil fuels) before the baseline examination might have led to exposure misclassifications

D.1.51 Hunt 2011

Bibliographic reference	**Hunt A, Crawford JA, Rosenbaum P F, et al (2011) Levels of household particulate matter and environmental tobacco smoke exposure in the first year of life for a cohort at risk for asthma in urban Syracuse, NY. Environment International 37(7), 1196-205**
Study design	Prospective cohort
Objective	To investigate possible associations between indoor exposures and infant health status (in particular wheezing)
Setting/Study location	United States
Number of participants	103 mother baby-dyads
Selected population	Yes (selected on based of being at risk of asthma)
Participant characteristics	Building characteristics: Location: urban Dwelling type: Not reported Building age: Not reported Type of ownership/tenancy: Not reported

Bibliographic reference	**Hunt A, Crawford JA, Rosenbaum P F, et al (2011) Levels of household particulate matter and environmental tobacco smoke exposure in the first year of life for a cohort at risk for asthma in urban Syracuse, NY. Environment International 37(7), 1196-205**
	Parental characteristics: Age: Not reported Current smoker (mother): 55 (54%) Hay fever: Not reported Atopy: Not reported but all mothers had asthma
Inclusion criteria	Documented history of maternal asthma Expectation of the mother residing in same residence for at least 1 year or an adjacent urban location Infant criteria Gestational age ≥ 37 weeks Birthweight ≥ 2500 g Absence of any major congenital abnormality Singleton birth
Exclusion criteria	None reported
Type of pollutant/exposure	Particulate matter 2.5 ≥15µg/m^3
Pollutant/exposure assessment	Particulate matter was collected using size selective Harvard impactors operating at 10 L/min placed in the living room
Outcome	Wheeze defined as Primary-care provided-documented wheezing, reactive airway disease, asthma or bronchiolitis or Wheeze heard on physical examination by the nurse practitioner or A prescription for bronchodilator, inhaled steroid or steroid pulse prescription document in the medical records
Results	Wheeze PM 2.5 ≥15µg/m^3=aOR 4.21 (1.36, 13.03)
Follow up	12 months
Newcastle-Ottawa Scale	Selection Representativeness of the exposed cohort • truly representative of the average infant in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • secure record of objective measurement Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for gender, maternal age and education, season of home visit and presence of carpeting Outcome Assessment of outcome • independent blind assessment or medical records

Bibliographic reference	Hunt A, Crawford JA, Rosenbaum P F, et al (2011) Levels of household particulate matter and environmental tobacco smoke exposure in the first year of life for a cohort at risk for asthma in urban Syracuse, NY. Environment International 37(7), 1196-205
	Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall assessment=Low**
Source of funding	**Government:** USEPA
Comments	Particulate matter was primarily sourced from environmental tobacco smoke

D.1.52 Ibargoyen-Roteta 2007

Bibliographic reference	Ibargoyen-Roteta N, Aguinaga-Ontoso I, Fernandez-Benitez M et.al (2007) Role of the home environment in rhinoconjuctivitis and eczema in schoolchildren in Pamplona, Spain. Journal of investigational allergology & clinical immunology 17(3), 137-44	
Study design	Prospective cohort study	
Objective	To analyse the possible home-condition risk factors for allergic rhino conjunctivitis, atopic eczema, and severe disease in schoolchildren	
Setting/Study location	Spain	
Number of participants	3360 children	
Selected population	No	
Participant characteristics	Description	
	Sex	Not reported
	Age (years)- range	5 – 8
	Ethnicity	Not reported
	Education	Not reported
	Annual family income	Not reported
Inclusion criteria	Not reported	
Exclusion criteria	Not reported	
Type of pollutant/exposure	Dust, moulds, animal dander,	
Pollutant/exposure assessment	Questionnaire (self-report)	
Outcome	Allergic Rhino conjunctivitis	
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between allergic rhinoconjuctivitis damp and mould	

Bibliographic reference	**Ibargoyen-Roteta N, Aguinaga-Ontoso I, Fernandez-Benitez M et.al (2007) Role of the home environment in rhinoconjuctivitis and eczema in schoolchildren in Pamplona, Spain. Journal of investigational allergology & clinical immunology 17(3), 137-44**	
		Allergic Rhinoconjuctivitis
	Moisture on walls	1.90 (1.01, 3.56)
	Moulds on walls	1.34 (0.64, 2.79)
	Single glass window	1.52 (1.03, 2.23)
	Double-glazed window	1.83 (1.26, 2.66)
Follow up	7 years	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average child Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • written self-report Demonstration that outcome of interest was not present at start of study • No Comparability Comparability of cohorts on the basis of the design or analysis • study controls for age • study controls for additional factor as follows – sex and language Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall level of bias – High** (concerns over self-reporting of outcome and exposure)	
Source of funding	**Government**: Navarre Department of Health	
Comments		

D.1.53 Iossifova 2009

Bibliographic reference	**Iossifova YY, Reponen T, Ryan PH, et al (2009) Mold exposure during infancy as a predictor of potential asthma development. Annals of allergy, asthma & immunology: official publication of the American College of Allergy, Asthma, and & Immunology 102(2), 131-7**
Study design	Prospective cohort study
Objective	To examine how exposure to mould in infancy predicts the risk of future asthma

Bibliographic reference	**Iossifova YY, Reponen T, Ryan PH, et al (2009) Mold exposure during infancy as a predictor of potential asthma development. Annals of allergy, asthma & immunology: official publication of the American College of Allergy, Asthma, and & Immunology 102(2), 131-7**	
Setting/Study location	United States	
Number of participants	483 children	
Selected population	No	
Participant characteristics	Individual characteristics	
	Age	Not reported
	Sex Male Female	 206 277
	Race / ethnicity Black Other	 77 406
	SES	Not reported
Inclusion criteria	Infants born between October 2001 and July 2003 in the Greater Cincinnati / Northern Kentucky area	
Exclusion criteria	Not reported	
Type of pollutant / exposure	Mould	
Pollutant / exposure assessment	The extent of home mould and water damage was categorized as none, low (mouldy odour or moisture damage or visible mould area<0.2 m2), and high (moisture damage and visible mould area ≥ 0.2 m2).	
Outcome	Adjusted odds ratio and 95% confidence intervals	
Results	 Visible mould (low vs none) Visible mould (high vs none)	Wheeze in children with atopy 1.86 (0.86, 4.00) 6.16 (1.38, 27.44)
Follow up	2 years	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average child in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • structured interview Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for maternal smoking	

Bibliographic reference	**Iossifova YY, Reponen T, Ryan PH, et al (2009) Mold exposure during infancy as a predictor of potential asthma development. Annals of allergy, asthma & immunology: official publication of the American College of Allergy, Asthma, and & Immunology 102(2), 131-7**
	• study controls for additional factors - race, number of siblings in the household, lower respiratory tract symptoms, and upper respiratory tract symptoms Outcome Assessment of outcome • independent assessment Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias: Low**
Source of funding	**Government:** National Institute of Environmental Health Sciences, **Academic:** National Institute for Occupational Safety and Health Training Program of the University of Cincinnati Education and Research Center
Comments	

D.1.54 Jaakkola 2005

Bibliographic reference	**Jaakkola JJ, Hwang BF, and Jaakkola N (2005) Home dampness and molds, parental atopy, and asthma in childhood: A six-year population-based cohort study. Environmental Health Perspectives 113(3), 357-61**	
Study design	Prospective cohort study	
Objective	To assess the relation between indicators of exposure to moulds and development of asthma later in life.	
Setting/Study location	Finland	
Number of participants	1,916 children	
Selected population	No	
Participant characteristics	Age (at baseline)	
	1	324 (16.3)
	2	301 (15.2)
	3	318 (16.0)
	4	333 (16.8)
	5	314 (15.8)
	6–7	394 (19.9)
	Sex	
	Male	983 (49.6%)
	Female	1,001 (50.5%)

<table>
<tr><th>Bibliographic reference</th><th colspan="2">Jaakkola JJ, Hwang BF, and Jaakkola N (2005) Home dampness and molds, parental atopy, and asthma in childhood: A six-year population-based cohort study. Environmental Health Perspectives 113(3), 357-61</th></tr>
<tr><td></td><td>Race/ Ethnicity

SES (reported as parental education)
No professional
Trade school
College or university</td><td>Not reported

369 (18.7)
523 (26.5)
1,085 (54.9)</td></tr>
<tr><td>Inclusion criteria</td><td colspan="2">Children living in the city of Espoo in Finland
Born between January 1, 1984, and December 31, 1989</td></tr>
<tr><td>Exclusion criteria</td><td colspan="2">Children with an asthma diagnosis at baseline or for whom no details on asthma were available</td></tr>
<tr><td>Type of pollutant/exposure</td><td colspan="2">Dampness and mould</td></tr>
<tr><td>Pollutant/exposure assessment</td><td colspan="2">Authors used indicators of exposure (mould odour, visible mould, moisture and water damage) defined from the answers to structured questions at baseline and at follow up</td></tr>
<tr><td>Health outcome</td><td colspan="2">Asthma</td></tr>
<tr><td>Results</td><td colspan="2">Adjusted incident rate ratios (aIRRs) and 95% confidence intervals (CIs)</td></tr>
<tr><td></td><td>Mould odour
Visible mould
Moisture in the surfaces
Water damage</td><td>2.44 (1.07, 5.60)
0.65 (0.24, 1.72)
0.92 (0.54, 1.54)
1.01 (0.45, 2.26)</td></tr>
<tr><td>Follow up</td><td colspan="2">6 years</td></tr>
<tr><td>Risk of bias (Newcastle-Ottawa Scale)</td><td colspan="2">Selection
Representativeness of the exposed cohort
• truly representative of the average child in the community
Selection of the non-exposed cohort
• drawn from the same community as the exposed cohort □
Ascertainment of exposure
• structured interview □
Demonstration that outcome of interest was not present at start of study
• Yes
Comparability
Comparability of cohorts on the basis of the design or analysis
• study controls for second-hand tobacco smoke
• study controls for additional factor as follows - Age, gender, duration of breastfeeding, parents’ highest education, single parent or guardian, maternal smoking in pregnancy, gas cooking, presence of hairy or feathery pets at home and type of day care
Outcome
Assessment of outcome
• self-report
Was follow-up long enough for outcomes to occur</td></tr>
</table>

Bibliographic reference	Jaakkola JJ, Hwang BF, and Jaakkola N (2005) Home dampness and molds, parental atopy, and asthma in childhood: A six-year population-based cohort study. Environmental Health Perspectives 113(3), 357-61
	• Yes Adequacy of follow up of cohorts • subjects lost to follow up unlikely to introduce bias - description provided of those lost) ☐ **Overall risk of bias=High** (concerns of self-report of exposure and outcome)
Source of funding	**Government:** Ministry of the Environment, the National Agency for Welfare, and Health and the Medical Research Council of the Academy of Finland, **Charity:** Yrjö Jahnsson Foundation.
Comments	.

D.1.55 Jaakkola 2010

Bibliographic reference	Jaakkola JJ. K, Hwang B, and Jaakkola M S (2010) Home Dampness and moulds as Determinants of Allergic Rhinitis in Childhood: A 6-Year, Population-based Cohort Study. American Journal of Epidemiology 172(4), 451-459				
Study design	Prospective cohort study				
Objective	To assess the relationship between exposure to moulds and dampness in dwellings and the risk of developing allergic rhinitis in childhood up to 14 years of age				
Setting/Study location	Finland				
Number of participants	1,863 children				
Selected population	No				
Participant characteristics	Description	Baseline		6 – year cohort	
		No.	%	No.	%
	Sex				
	Male	1,258	49.0	983	49.6
	Female	1,310	51.0	1,001	50.5
	Age (years)				
	1	424	16.5	324	16.3
	2	405	15.8	301	15.2

Bibliographic reference	**Jaakkola JJ. K, Hwang B, and Jaakkola M S (2010) Home Dampness and moulds as Determinants of Allergic Rhinitis in Childhood: A 6-Year, Population-based Cohort Study. American Journal of Epidemiology 172(4), 451-459**				
Study design	Prospective cohort study				
	3	410	16.0	318	16.0
	4	400	15.6	333	16.8
	5	415	16.2	314	15.8
	6-7	514	20.0	394	19.9
	Ethnicity	Not reported		Not reported	
	Maintenance medication use	Not reported		Not reported	
	Parental asthma and/or atopic	Not reported		Not reported	
	Parental education (years)				
	Nonprofessional	498	19.5	369	18.7
	Trade school	663	25.9	523	26.5
	College or university	1,395	54.6	1,085	54.9
	Annual family income	Not reported		Not reported	
	Building characteristics				
	Gas stove				
	Yes	86	3.4	62	3.1
	No	2,469	96.6	1,913	96.9
Inclusion criteria	Children living in the city of Espoo in Finland Born between January 1, 1984, and December 31, 1989 Children who did not have physician-diagnosed rhinitis				
Exclusion criteria	Not reported				
Type of pollutant/exposure	Dampness and mould				
Pollutant/exposure assessment	Authors used indicators of exposure (mould odour, visible mould, moisture and water damage) defined from the answers to structured questions at baseline and at follow up				
Health outcome	New cases of allergic rhinitis				
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for dampness and mould and incidence of allergic rhinitis				
	Exposure		Allergic rhinitis		
	Water damage Moisture on the surfaces Visible mould		2.06 (1.35, 3.13) 1.73 (1.27, 2.38) 1.98 (1.32, 2.99)		

Bibliographic reference	**Jaakkola JJ. K, Hwang B, and Jaakkola M S (2010) Home Dampness and moulds as Determinants of Allergic Rhinitis in Childhood: A 6-Year, Population-based Cohort Study. American Journal of Epidemiology 172(4), 451-459**
Study design	Prospective cohort study
Follow up	6 years
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average child in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • structured interview Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for second-hand tobacco smoke • study controls for additional factor as follows - Age, gender, duration of breastfeeding, parents' highest education, single parent or guardian, maternal smoking in pregnancy, gas cooking, presence of hairy or feathery pets at home and type of day care Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • subjects lost to follow up unlikely to introduce bias - description provided of those lost) **Overall risk of bias=High** (concerns of self-report of exposure and outcome)
Source of funding	**Government:** Supported by the Ministry of the Environment, the National Agency for Welfare and Health, the Medical Research Council of the Academy of Finland and the Yrjo Jahnsson Foundation and the Medical Research Council of the Academy of Finland
Comments	Evidence suggests increase risk of allergic rhinitis to damp and mould, with a higher risk of allergic rhinitis related to a longer duration of exposure.

D.1.56 Jedrychowski 2005

Bibliographic reference	**Jedrychowski W, Galas A, Pac A, et al (2005) Prenatal ambient air exposure to polycyclic aromatic hydrocarbons and the occurrence of respiratory symptoms over the first year of life. European journal of epidemiology 20(9), 775-82**
Study design	Prospective cohort study
Objective	To test the hypothesis that infants with higher levels of prenatal exposure to PAHs may be at greater risk of developing respiratory symptoms.

Bibliographic reference	**Jedrychowski W, Galas A, Pac A, et al (2005) Prenatal ambient air exposure to polycyclic aromatic hydrocarbons and the occurrence of respiratory symptoms over the first year of life. European journal of epidemiology 20(9), 775-82**	
Setting/Study location	Poland	
Number of participants	333 infants	
Selected population	No	
Participant characteristics	Description	N (%)
	Sex	
	Male	168 (50.5%)
	Age	Not reported
	Maternal allergy	81 (24.3%)
	Ethnicity	Not reported
	Education	Not reported
	Annual family income	Not reported
Inclusion criteria	Non-smoking women Ages 18–35 years Singleton pregnancies Free from chronic diseases such as diabetes and hypertension	
Exclusion criteria	Not reported	
Type of pollutant/exposure	Polycyclic aromatic hydrocarbons (PAH)	
Pollutant/exposure assessment	Monitoring of personal PAH inhalation was carried out in all pregnant women for over a 48-hour period during the second trimester of pregnancy.	
Outcome	Runny or stuffy nose, Ear infections (otitis media) Sore throat, Cough with or without cold, barking cough, Difficult (puffed) breathing, Wheezing or whistling in the chest irrespective of respiratory infection, Wheezing without cold.	
Results	Adjusted risk ratios (aHRs) and 95% confidence intervals (CIs) (per log unit of PAH concentration in ng/m^3)	
		aRR (95%CI)
	Runny or stuffy nose	1.11 (0.97–1.27)
	Ear infections (otitis media)	1.82 (1.03–3.23)
	Sore throat,	1.27 (1.07–1.52)
	Cough	1.72 (1.02–2.92)
	Cough without cold,	4.80 (2.73–8.44)
	Barking cough,	1.12 (0.82–1.55)
	Difficult (puffed) breathing,	1.23 (0.83–1.84)
	Wheezing or whistling in the chest irrespective of respiratory infection,	3.83 (1.18–12.43)
	Wheezing without cold.	1.96 (1.38–2.78)
Follow up	2 years	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average pregnant woman	

Bibliographic reference	Jedrychowski W, Galas A, Pac A, et al (2005) Prenatal ambient air exposure to polycyclic aromatic hydrocarbons and the occurrence of respiratory symptoms over the first year of life. European journal of epidemiology 20(9), 775-82
	Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • written self-report Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for gender of child, child's birth weight, season of birth, ETS in postnatal period, mother's allergy, mother's education level, moulds at home. Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall assessment=Moderate** (concerns over self-report of outcomes)
Source of funding	**Government:** National Institute of Environmental Health Sciences **Charity:** The Gladys and Roland Harriman Foundation N. York
Comments	

D.1.57 Jedrychowski 2010

Bibliographic reference	Jedrychowski WA, Perera FP, Maugeri U, et al (2010) Intrauterine exposure to polycyclic aromatic hydrocarbons, fine particulate matter and early wheeze. Prospective birth cohort study in 4-year olds. Pediatric allergy and immunology: official publication of the European Society of Pediatric Allergy and Immunology 21(4 Pt 2), e723-32
Study design	Prospective cohort
Objective	To examine relationship between prenatal exposure to PAH compounds to the onset and frequency of wheezing in early childhood.
Setting/Study location	Poland
Number of participants	369
Selected	No

Bibliographic reference	**Jedrychowski WA, Perera FP, Maugeri U, et al (2010) Intrauterine exposure to polycyclic aromatic hydrocarbons, fine particulate matter and early wheeze. Prospective birth cohort study in 4-year olds. Pediatric allergy and immunology: official publication of the European Society of Pediatric Allergy and Immunology 21(4 Pt 2), e723-32**	
Participant characteristics	Building characteristics: Location: Dwelling type: single family home multi-family home Building age: Type of ownership/tenancy: Individual characteristics: Age (range) Gender: Male (%) Girls (%) Smoker in home: Race	 Not reported 4090 (85.6% 546 (11.4%) Not reported Not reported 1 – 6 years of age 170 (50.1%) 169 (49.9%) Not reported Not reported
Inclusion criteria	women 18-35 years of age claimed to be non-smokers, singleton pregnancies, without illicit drug use and HIV infection, free from chronic diseases such as diabetes or hypertension, and resided in Krakow for at least one year prior to pregnancy	
Exclusion criteria	None reported	
Type of pollutant/exposure	Polycyclic aromatic hydrocarbons (PAH's) (>0.250 adducts per 108 nucleotides) Particulate matter 2.5 Damp / Mould	
Pollutant/exposure assessment	Prenatal exposure to PAHs were measured by PAH-DNA adducts in umbilical cord blood. The level of PAH-DNA adducts in the cord blood is assumed to reflect the cumulative dose of PAHs absorbed by the fetus over the prenatal period. Monitoring of personal of fine particles ($PM_{2.5}$) was carried out in all pregnant women over a 48-hour period during the second trimester of pregnancy. The women were instructed by the trained staff member as how to use personal monitor and asked to carry the monitoring device during the daytime hours for two consecutive days and place it by their bed at night. On the second day the air monitoring staff assistant and interviewer visited the woman's home to change the battery-pack and to complete the questionnaire on the household characteristics.	
Outcome	Wheeze	
Results	 Damp / mould Cord blood PAH-adducts	IRR (95%CI) for wheeze in years 1 & 2 1.429 (1.265, 1.614) 1.686 (1.517, 1.875) 1.377 (1.252, 1.514)

Bibliographic reference	**Jedrychowski WA, Perera FP, Maugeri U, et al (2010) Intrauterine exposure to polycyclic aromatic hydrocarbons, fine particulate matter and early wheeze. Prospective birth cohort study in 4-year olds. Pediatric allergy and immunology: official publication of the European Society of Pediatric Allergy and Immunology 21(4 Pt 2), e723-32**	
	Particulate matter2.5 (median prenatal 35.4 µg/m^3) Damp / mould Cord blood PAH-adducts Particulate matter2.5 (median prenatal 35.4 µg/m^3)	IRR (95%CI) for wheeze in years 3 & 4 1.669 (1.390, 2.005) 0.956 (0.836, 1.093) 1.063 (0.923, 1.223)
Follow up	5 years	
Newcastle-Ottawa Scale	Selection Representativeness of the exposed cohort • truly representative of the average child in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • secure record (monitors) • structured interview Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for exposure to environmental tobacco smoke • study controls for other factors including gender, maternal atopy and maternal education Outcome Assessment of outcome • Maternal report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • subjects lost to follow up unlikely to introduce bias **Overall assessment=Moderate** (concerns over self-report of outcomes)	
Source of funding	Government: National Institute of Environmental Health Sciences (NIEHS); Charity; the Lundin Foundation; the Gladys T. and Roland Harriman Foundation.	
Comments	Part of a larger cohort Data from years 3-4 used in GRADE table	

J

D.1.58 1 Jedrychowski 2011

Bibliographic reference	**Jedrychowski W, Spengler JD, Maugeri U, et al (2011) Joint effect of prenatal exposure to fine particulate matter and intake of Paracetamol (Acetaminophen) in pregnancy on eczema occurrence in early childhood. The Science of the total environment 409(24), 5205-9**	
Study design	Prospective cohort study	
Objective	To assess the role of very low prenatal exposure to Paracetamol in the occurrence of eczema symptoms in early childhood and assess the possible interaction with prenatal exposure to particulate pollutants	
Setting/Study location	Poland	
Number of participants	322 infants	
Selected population	No	
Participant characteristics	Description	
	Sex	
	Male	159 (49.4%)
	Female	163 (50.6%)
	Age (years)- Mean (SD) Maternal	27.82 (3.39)
	Ethnicity	Not reported
	Education	
	Elementary	28 (8.7%)
	Medium	77 (23.9%)
	Higher	217 (67.4%)
	Annual family income	Not reported
Inclusion criteria	Non-smoking women Ages 18–35 years Singleton pregnancies Free from chronic diseases such as diabetes and hypertension	
Exclusion criteria	Not reported	
Type of pollutant/exposure	$PM_{2.5}$, Damp/mould	
Pollutant/exposure assessment	Questionnaire (Damp / Mould) The woman was asked to wear the backpack monitor during the daytime hours for 2 consecutive days and to place the monitor near the bed at night. During the morning of the second day, the air monitoring staff-person and interviewer visited the woman's home to change the battery pack and administer the full questionnaire. A Personal Environmental Monitoring Sampler (PEMS) was used to measure particle mass. The PEMS is designed to achieve the particle target size of ≤ 2.5 μm at a flow rate of 4.0 liters per minute (LPM) with an array of 10 impactor nozzles. Flow rates are calibrated (with filters in place) using a bubble meter prior to the monitoring and are checked again with a change of the battery pack on the second day and at the conclusion of the monitoring. Pumps operated continuously at 2 LPM over the 48-hour period.	
Outcome	Eczema	

Bibliographic reference	**Jedrychowski W, Spengler JD, Maugeri U, et al (2011) Joint effect of prenatal exposure to fine particulate matter and intake of Paracetamol (Acetaminophen) in pregnancy on eczema occurrence in early childhood. The Science of the total environment 409(24), 5205-9**	
Results	Adjusted hazard ratios (aHRs) and 95% confidence intervals (CIs) for association between prenatal $PM_{2.5}$, damp/mould and occurrence of eczema in early childhood	
		Occurrence of eczema
		aHR (95%CI)
	Prenatal $PM_{2.5}$	1.06 (0.72, 1.57)
	Damp/mould house	1.22 (1.07, 1.40)
Follow up		
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average pregnant woman Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • written self-report Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for prenatal and postnatal exposure to environmental tobacco smoke • study controls for additional factor as follows – maternal education, maternal atopy, gender of child, presence of older siblings, breastfeeding practice, and the presence of moulds in the household). Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall assessment=Moderate** (concerns over self-report of outcomes)	
Source of funding	**Government:** National Institute of Environmental Health Sciences **Charity:** The Gladys and Roland Harriman Foundation	
Comments		

D.1.59 1 Jung 2012

Bibliographic reference	Jung KH, Yan B, Moors K, et al (2012) Repeated exposure to polycyclic aromatic hydrocarbons and asthma: effect of seroatopy. Annals of allergy, asthma & immunology: official publication of the American College of Allergy, Asthma, and & Immunology 109(4), 249-54			
Study design	Prospective cohort study			
Objective	To examine whether the associations between repeated early pyrene and ∑8PAH non-volatile exposure and asthma would differ between nonatopic and atopic children			
Setting/Study location	United States			
Number of participants	349 children			
Selected population	No			
Participant characteristics	Individual characteristics: Age- Gender: Female Race Education Maternal high school or greater degree Smoking Prenatal ETS Postnatal ETS	 Not reported 201 (53%) Not reported 238 (63%) 115 (31%) 161 (43%)		
Inclusion criteria	Not reported			
Exclusion criteria	Not reported			
Type of pollutant/exposure	Polycyclic aromatic hydrocarbons (PAHs): pyrene and Σ8PAH non-volatile			
Pollutant/exposure assessment	Prenatal PAH (pyrene and Σ8 PAH non-volatile) exposure was measured from 48-hour personal air monitoring between 1998 and 2006, and PAH exposure at 5 to 6 years of age was measured from 2-week residential indoor monitoring between 2005 and 2011			
Outcome	Asthma Wheeze Visits to emergency department			
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between PAH, asthma, wheeze and emergency department visits			
		Asthma	Wheeze	Emergency department visits
		aOR (95%CI)	aOR (95%CI)	aOR (95%CI)
	Pyrene	1.90 (1.13, 3.20)	1.53 (0.93, 2.51)	1.21 (0.71, 2.09)
	Σ8PAH non-volatile	0.90 (0.52, 1.56)	0.86 (0.52, 1.42)	0.82 (0.46, 1.45)
Follow up	6 years			

Bibliographic reference	**Jung KH, Yan B, Moors K, et al (2012) Repeated exposure to polycyclic aromatic hydrocarbons and asthma: effect of seroatopy. Annals of allergy, asthma & immunology: official publication of the American College of Allergy, Asthma, and & Immunology 109(4), 249-54**
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average child in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • Objective sampling Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for exposure to environmental tobacco smoke • study controls for any additional factors as follows – maternal ethnicity, sex, maternal asthma, maternal education and cold/influenza season Outcome Assessment of outcome • independent blind assessment self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias – Moderate** (concerns over self-report of some outcomes)
Source of funding	**Government:** National Institutes of Health; Environmental Protection Agency; **Charity:** The Educational Foundation of America; the John & Wendy Neu Family Foundation; the New York Community Trust; and the Trustees of the Blanchette Hooker Rockefeller Fund.
Comments	

D.1.60 Jung 2012 b

Bibliographic reference	**Jung KH, Hsu SI, Yan B, et al (2012) Childhood exposure to fine particulate matter and black carbon and the development of new wheeze between ages 5 and 7 in an urban prospective cohort. Environment international 45, 44-50**
Study design	Prospective cohort study
Objective	To examine associations between pollutant levels and subsequent new onset of respiratory symptoms and indoor allergen specific immunoglobulin (Ig) E at age 7 years after controlling for known covariates.

Bibliographic reference	**Jung KH, Hsu SI, Yan B, et al (2012) Childhood exposure to fine particulate matter and black carbon and the development of new wheeze between ages 5 and 7 in an urban prospective cohort. Environment international 45, 44-50**	
Setting/Study location	United States	
Number of participants	408 children	
Selected population	No	
Participant characteristics	Description	
	Gender	
	Girls	192 (55%)
	Age	Not reported
	Ethnicity (maternal)	221 (63%)
	Dominican	128 (37%)
	African American	
	Education (maternal)	
	high school or greater degree	221 (64%)
	SES	Not reported
	Building characteristics	Not reported
Inclusion criteria	Not reported	
Exclusion criteria	Not reported	
Type of pollutant/exposure	$PM_{2.5}$	
Pollutant/exposure assessment	Indoor air monitors were placed in a room where the child spent most of his or her time (mostly the room where the child sleeps). Two-week integrated indoor $PM_{2.5}$ measures, soot-BC using multi-wavelength techniques, and Abs* using reflectance measurement were collected at each of the first 262 homes between October 2005 and May 2011, with a repeat air sampling performed 6 months (6.3 months ± 0.7; mean ± standard deviation) later to capture the seasonal variability in air pollution levels.	
Outcome	New wheeze (no wheeze up to 5 years and wheeze in past 12 months at 6 or 7 years of age	
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between $PM_{2.5}$ and wheeze incidence	
		Wheeze
		aOR (95%CI)
	$PM_{2.5}$ Per IQR increase (8.75 μg/m^3,)	1.51 (1.05, 2.16)
Follow up	12 months	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average child in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure	

Bibliographic reference	Jung KH, Hsu SI, Yan B, et al (2012) Childhood exposure to fine particulate matter and black carbon and the development of new wheeze between ages 5 and 7 in an urban prospective cohort. Environment international 45, 44-50
	• objective sampling Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for prenatal and postnatal environmental tobacco smoke exposure • study controls for additional factors - ethnicity, sex, maternal education, maternal asthma, cold/flu season, residential monitoring conducted prior to age 6,) Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • No Adequacy of follow up of cohorts complete follow up - all subjects accounted for **Overall risk of bias: Moderate** (concerns over self-report of outcome)
Source of funding	**Government:** NIH **Charity:** The Educational Foundation of America, the John & Wendy Neu Family Foundation, the New York Community Trust, and the Trustees of the Blanchette Hooker Rockefeller Fund.
Comments	

D.1.61 Jung 2014

Bibliographic reference	Jung KH, Perzanowski M, Rundle A, et al (2014) Polycyclic aromatic hydrocarbon exposure, obesity and childhood asthma in an urban cohort. Environmental research 128, 35-41	
Study design	Prospective cohort study	
Objective	To examine whether obesity may modify the effects of age 5–6 year PAH exposure, and semi volatile and alkylated PAHs in particular, on asthma in 5–7 year old inner-city children	
Setting/Study location	United States	
Number of participants	363 children	
Selected populations	No	
Participant characteristics	Individual characteristics:	
	Age-years	6 – 7
	Gender:	
	Female	164 (53%)
	Race	Not reported

Bibliographic reference	**Jung KH, Perzanowski M, Rundle A, et al (2014) Polycyclic aromatic hydrocarbon exposure, obesity and childhood asthma in an urban cohort. Environmental research 128, 35-41**	
	Education Maternal high school or greater degree Smoking Prenatal ETS Postnatal ETS	 193 (62%) 100 (32%) 142 (46%)
Inclusion criteria	Not reported	
Exclusion criteria	Not reported	
Type of pollutant/exposure	Polycyclic aromatic hydrocarbons (PAHs): Σ8PAH semi-volatile and Σ8PAH non-volatile	
Pollutant/exposure assessment	Indoor air monitors were placed in a room where the child spent most of his or her time for two weeks at age 5 through 6.	
Outcome	Asthma	
Results	Adjusted relative risks (aRRs) and 95% confidence intervals (CIs) for association between PAH concentration and asthma at age 5 years	
		Asthma
		aRR (95%CI)
	Pyrene	0.81 (0.59–1.12)
	Σ8PAH semi-volatile	0.82 (0.60–1.12)
	Σ8PAH non-volatile	0.74 (0.46–1.18)
Follow up	2 years	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average child in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • Objective sampling Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for prenatal and childhood exposure to environment tobacco smoke • study controls for additional factor ethnicity, sex, maternal education, maternal asthma, cold/flu season, residential monitoring conducted at age 5 vs 6 years, heating season, seroatopic, prenatal pyrene, $PM_{2.5}$ and Black carbon Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts	

Bibliographic reference	Jung KH, Perzanowski M, Rundle A, et al (2014) Polycyclic aromatic hydrocarbon exposure, obesity and childhood asthma in an urban cohort. Environmental research 128, 35-41
	• complete follow up - all subjects accounted for **Overall risk of bias – Moderate** (Concerns over self-report of outcomes)
Source of funding	**Government:** National Institutes of Health, Environmental Protection Agency **Charity:** The Educational Foundation of America, the John & Wendy Neu Family Foundation, the New York Community Trust, and the Trustees of the Blanchette Hooker Rockefeller Fund
Comments	

D.1.62 Karvonen 2015

Bibliographic reference	Karvonen A M, Hyvarinen A, Korppi M et.al (2015). Moisture damage and asthma: a birth cohort study. Paediatrics, 135(3), pp. e598-606.		
Study design	Prospective cohort study		
Objective	To prospectively evaluate whether inspector-observed moisture damage with or without visible mould in the home in infancy is associated with the development of new physician diagnosed asthma and with respiratory tract symptoms and atopic sensitization up to the age of 6 years		
Setting/Study location	Finland		
Number of participants	398 children		
Selected population	No		
	Description	No.	%

Bibliographic reference	**Karvonen A M, Hyvarinen A, Korppi M et.al (2015). Moisture damage and asthma: a birth cohort study. Paediatrics, 135(3), pp. e598-606.**			
Participants characteristics	Sex			
	Male	Not reported	Not reported	
	Female	Not reported	Not reported	
	Age	Not reported	Not reported	
	Ethnicity	Not reported	Not reported	
	(Maintenance) medication use	Not reported	Not reported	
	Parental asthma and/or atopic	Not reported	Not reported	
	Parental education	Not reported	Not reported	
	Annual family income	Not reported	Not reported	
	Building characteristics	Not reported	Not reported	
Inclusion criteria	A family could participate in the study: Only with 1 child Mothers living on a farm with livestock, in rural areas or suburban areas Age ≥ 18 years Singleton pregnancy Delivery in a hospital No plans to move from the study area and spoke Finnish language			
Exclusion criteria	Premature delivery (< 37 weeks of gestation) Home delivery Congenital abnormalities in the infants and failure to obtain cord blood samples			
Type of pollutant/exposure	Moisture damage with mould			
Pollutant/exposure assessment	Sign of excess moisture graded by using a 6-point “need to repair” estimation scale and area damaged was measured. If there were several moisture-damaged locations in a given room or area, the areas of damage with the same need for repair estimation were totalled. Presence of mould odour or visible mould was recorded for each damage observation. Mould growth only on silicone sealants in the kitchen or in the bathroom was classified as no mould. The cut-off level to define atopic sensitization to inhalant allergens was 0.70 kU/L at the age of 6 years.			
Health outcome	Asthma: Incidence of asthma ever Wheezing, nocturnal cough and sensitisation to inhalant allergens			
Results		wheezing	Nocturnal cough	Asthma
	Minor moisture damage with or without mould spots in child’s main living area	1.16 (0.69, 1.94)	1.07 (0.71,1.59)	1.31 (0.72, 2.36)
	Major moisture damage or any moisture damage with visible	1.69 (0.88, 3.24)	1.27 (0.77, 2.09)	1.33 (0.60, 2.98)

Bibliographic reference	Karvonen A M, Hyvarinen A, Korppi M et.al (2015). Moisture damage and asthma: a birth cohort study. Paediatrics, 135(3), pp. e598-606.
	mould in child's main living area
Follow up	6 years
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average child in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • home inspection by trained engineers Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for smoking during pregnancy • study controls for additional factors as follows - study cohort, farming status, gender, maternal history of allergic diseases and number of siblings Outcome Assessment of outcome • independent blind assessment Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • subjects lost to follow up unlikely to introduce bias - description provided of those lost) **Overall assessment=Low**
Source of funding	Government: Study supported by research grants from the European Union (grant QLK4-CT-2001-00250); the Graduate School in Environmental Health (SYTYKE); EVO and VTR funding; the Farmers' Social Insurance Institution (Mela); the Academy of Finland (grant 139021); the Juho Vainio Foundation; the Finnish Cultural Foundation; and the Finnish National Institute for Health and Welfare.
Comments	A combined variable ("moisture damage or mould in the child's main living areas") was created by using information regarding signs of moisture damage and visible mould in the child's bedroom, the living room, or kitchen. Moisture damage and mould in early infancy in the child's bedroom, living room, or kitchen were associated with asthma development. Atopic children may be more susceptible than non-atopic children to the harmful effects of moisture damage and mould growth. Study suggests association between moisture damage in the living rooms, child's bedrooms, and kitchens with the risk of physician-diagnosed asthma ever, persistent asthma, and respiratory symptoms Associations with asthma ever were strongest for moisture damage with visible mould in the child's bedroom and in the living room.

D.1.63 Kingsley 2015

Bibliographic reference	**Kingsley S L, Eliot M N, Whitsel E A et.al (2015) Residential proximity to major roadways and incident hypertension in post-menopausal women. Environ Res. 2015 October; 142: 522–528.**		
Study design	Prospective cohort study		
Objective	To assess the association between residential distance to nearest major roadway and the risk of incident hypertension in the Women's Health Initiative (WHI) Clinical Trial (CT) cohorts		
Setting/Study location	United States		
Number of participants	38,360 women between 50 and 79 years of age		
Participant characteristics	Description	No.	%
	Sex	All female	All female
	Age (years); mean (SD)	61.6 ± 6.9	-
	Ethnicity		
	White, Non-Hispanic	32529	84.8
	Black, Non-Hispanic	2647	6.9
	Hispanic/Latino	1765	4.6
	Asian or Pacific Islander	805	2.1
	Other	422	1.1
	Cases/selected population	Not reported	Not reported
	Socio-economic status (maternal education)		
	<college degree	21060	54.9
	College graduate	14116	36.8
	Building characteristics	Not reported	Not reported
Inclusion criteria	Not reported		
Exclusion criteria	Participants with hypertension at baseline defined as a systolic blood pressure (SBP) ≥140 mmHg, a diastolic blood pressure (DBP) ≥90 mmHg Self-reported use of antihypertensive medication at baseline, or use of an antihypertensive medication as determined at baseline via medical inventory		
Type of pollutant/exposure	Residential proximity to major roadways		
Pollutant/exposure assessment	Major roadways were defined as those with US census feature class codes A1 (primary highway with limited access), A2 (primary road without limited access), or A3 (secondary and connecting roads). A1 and A2 roadways include interstate highways and US highways, which typically contain a mix of car and truck traffic moving at higher speeds, and A3 roadways include state highways and other major arteries, which typically have lower traffic counts moving at slower average speeds.		
Outcome	Incident hypertension		
Results	Adjusted hazard ratios (aHRs) and 95% confidence intervals (CIs) for association between categories of residential distance to nearest major roadway and incident hypertension		
		Incident hypertension	
	Residential Distance to Nearest Major Roadway (metres)	HR (95%CI)	

Bibliographic reference	**Kingsley S L, Eliot M N, Whitsel E A et.al (2015) Residential proximity to major roadways and incident hypertension in post-menopausal women. Environ Res. 2015 October; 142: 522–528.**	
	≤50	1.09 (0.95, 1.24)
	>50-200	1.02 (0.94, 1.10)
	>200-400	1.04 (0.97, 1.11)
	>400-1000	1.03 (0.98, 1.08)
	>1000	1.00 (Ref.)
Follow up	Median of 7.9 years	
Study methods	Incident hypertension was defined as an SBP ≥140 mmHg, a DBP ≥90 mmHg, or a first self-report of medication prescribed for hypertension. Blood pressure was measured at clinical centres by trained personnel using standardized procedures after participants had been seated for 5 minutes. Authors used stratified Cox proportional hazards models to estimate incident hypertension associated with living ≤50, >50-200, >200-400, >400-1000 m from nearest major roadway compared to >1000 m, stratified by study region	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average population in the community Selection of the non-exposed cohort • no description of the derivation of the non-exposed cohort Ascertainment of exposure • validated measurement used Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for age, race, smoking status, alcohol consumption, education, household income, employment status, high cholesterol, participation in the hormone replacement therapy trial Outcome Assessment of outcome • measured at clinical centres by trained personnel using standardized procedures Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • subjects lost to follow up unlikely to introduce bias **Overall risk of bias: low**	
Source of funding	**Government:** National Institute of Environmental Health Sciences (NIEHS), NIH, National Heart, Lung, and Blood Institute (NHLBI), NIH, U.S. Department of Health and Human Services **Academic**: Brown University.	
Comments		

D.1.64 1 Koloski 2015

Bibliographic reference	**Koloski N, Jones M, Weltman M, et al (2015) Identification of early environmental risk factors for irritable bowel syndrome and dyspepsia. Neurogastroenterology and motility 27(9), 1317-1325**	
Study design	Prospective study	
Objective	To assess the role of a range of early environmental factors in IBS and functional dyspepsia	
Setting/Study location	Australia	
Number of participants	767 adults	
Selected population	No	
Participant characteristics	Individual characteristics	
	Age – Mean (SD)	59.9 (11.5)
	Sex Female	 48.2%
	Race / ethnicity	Not reported
	SES	Not reported
Inclusion criteria	Random sample of population who had taken part in 2 sirveys 1997 and 2011	
Exclusion criteria	Not reported	
Type of pollutant / exposure	Pets	
Pollutant / exposure assessment	Self-report	
Outcome	Adjusted odds ratio and 95% confidence intervals	
Results	Irritable bowel syndrome Pet exposure Herbivore pet Carnivore pet Omnivore pet Functional dyspepsia Pet exposure Herbivore pet Carnivore pet Omnivore pet	 1.47 (0.83, 2.61) 2.09 (1.19, 3.67) 1.58 (0.90,2.76) 0.97 (0.26, 3.59) 1.69 (0.86, 3.36) 2.34 (1.24, 4.45) 2.04 (1.03, 4.03) 0.98 (0.21, 4.50)
Follow up		
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average adult) in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort	

Bibliographic reference	Koloski N, Jones M, Weltman M, et al (2015) Identification of early environmental risk factors for irritable bowel syndrome and dyspepsia. Neurogastroenterology and motility 27(9), 1317-1325
	Ascertainment of exposure • Questionnaire Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for age • study controls for additional factor – gender and frequency of walking Outcome Assessment of outcome • independent assessment Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias: Low**
Source of funding	Non funding declared
Comments	

D.1.65 Korppi 2008

Bibliographic reference	Korppi M, Hyvarinen M, Kotaniemi-Syrjanen A et al (2008) Early exposure and sensitization to cat and dog: different effects on asthma risk after wheezing in infancy. Pediatric allergy and immunology: official publication of the European Society of Pediatric Allergy and Immunology 19(8), 696-701	
Study design	Cohort study	
Objective	To evaluate associations between exposure and sensitization to cats or dogs in infancy and later asthma and allergy in children hospitalized for wheezing at<24 months of age	
Setting/Study location	Finland	
Number of participants	100 children	
Selected population	Yes – children requiring hospitalisation for wheeze	
Participant characteristics	Description	
	Sex	Not reported
	Age (months) – range	1 - 23
	Ethnicity	Not reported
	Education	Not reported
	SES	Not reported

Bibliographic reference	**Korppi M, Hyvarinen M, Kotaniemi-Syrjanen A et al (2008) Early exposure and sensitization to cat and dog: different effects on asthma risk after wheezing in infancy. Pediatric allergy and immunology: official publication of the European Society of Pediatric Allergy and Immunology 19(8), 696-701**	
Inclusion criteria	Presence of wheezing and respiratory distress requiring hospital care during an acute respiratory tract infection	
Exclusion criteria	Not reported	
Type of pollutant/exposure	Exposure to furry pets	
Pollutant/exposure assessment	Parent report	
Outcome	Physician-diagnosed persistent childhood asthma	
Results		aOR (95%CI)
	Exposure to cats	0.26 (0.03, 2.42)
	Exposure to dogs	0.20 (0.02, 1.78)
Follow up	12.3 years (median)	
Newcastle-Ottawa Scale	Selection Representativeness of the exposed cohort • selected group of children Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • self-report (parent) • no description Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for parental history of asthma • study controls for additional factors – atopic dermatitis in infancy and RSV aetiology of bronchiolitis.) Outcome Assessment of outcome • independent blind assessment Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias – Moderate** (concerns over self-report of exposure)	
Source of funding	Not reported	
Comments		

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D.1.661 Larsson 2009

Bibliographic reference	**Larsson M, Weiss B, Janson S, et al (2009) Associations between indoor environmental factors and parental-reported autistic spectrum disorders in children 6-8 years of age. NeuroToxicology 30(5), 822-831**	
Study design	Cohort	
Objective	To determine the associations between ASD in children aged 6-8 years and a number of environmental factors, including exposure conditions when they were 1-3 years of age and during pregnancy and the first year of life.	
Setting/Study location	Sweden	
Number of participants	4779 children	
Selected population	No	
Participant characteristics	Building characteristics:	N (%)
	Dwelling type:	
	Single family home	4090 (85.6)
	Multi-family home	546 (11.4)
	Building age:	Not reported
	Type of ownership/tenancy:	Not reported
	:	
	Age of child	
	6 years	135 (2.8)
	7 years	3240 (67.8)
	8 years	1332 (27.9)
	Current smoker	
	Any	909 (19.0)
	Mother	605 (12.7)
	Father	398 (8.3)
Inclusion criteria	Provided data at two survey timepoints	
Exclusion criteria	Not reported	
Type of pollutant/exposure	Phthalates in house dust (PVC flooring used as proxy)	
Pollutant/exposure assessment	Self-report of use of PVC flooring Condensation on window	
Outcome	Autism spectrum disorder, (ASD)	
Results		aOR (95%CI)
	PVC flooring in child's room	1.19 (0.71, 2.00)
	Condensation on windows (1- 5 cm) in child's room	1.35 (0.71, 2.57)
	Condensation on windows (> 5 cm) in child's room	2.05 (1.03, 4.10)
	PVC flooring in parents 'room	1.59 (0.97, 2.61)
	Condensation on windows (1- 5 cm) in parent's room	1.52 (0.84, 2.73)
	Condensation on windows (> 5 cm) in parent's room	2.03 (1.08, 3.82)
Follow up	5 years	
Newcastle-Ottawa Scale	Selection Representativeness of the exposed cohort • truly representative of the average child in the community Selection of the non-exposed cohort	

Bibliographic reference	**Larsson M, Weiss B, Janson S, et al (2009) Associations between indoor environmental factors and parental-reported autistic spectrum disorders in children 6-8 years of age. NeuroToxicology 30(5), 822-831**
	• drawn from the same community as the exposed cohort Ascertainment of exposure • written self-report Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for sex, age of the child (6, 7, or 8 years old), any smoking in mother (smoking during pregnancy and/or smoking during the child's first year and/or current smoking vs. No smoking in the mother), asthma in the child 2000 (no vs. yes), financial insecurity expressed as problems with paying bills (no, yes, no reply), and condensation on the inside of the windows in the child's room during winter time as a proxy for low ventilation (no, 1-5 cm, >5 cm) Outcome Assessment of outcome • self-report (parent) Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • Unlikely to introduce bias **Overall assessment=Moderate** (concerns over parental report of outcome)
Source of funding	**Government:** Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas), Swedish Asthma and Allergy Association's Research Foundation, and the Swedish Foundation for Health Care Sciences and Allergy Research.
Comments	None

D.1.67 Larsson 2010

Bibliographic reference	**Larsson M, Hagerhed-Engman L, Kolarik B et al (2010) PVC as flooring material and its association with incident asthma in a Swedish child cohort study. Indoor air 20(6), 494-501**
Study design	Cohort study
Objective	To examine the association between exposure to PVC flooring in the child’s or parent’s bedroom in the homes of children aged 1 – 3 years and the incidence of asthma, rhinitis and eczema in the follow 5 years
Setting/Study location	Sweden
Number of participants	2779 children
Selected population	No

Bibliographic reference	**Larsson M, Hagerhed-Engman L, Kolarik B et al (2010) PVC as flooring material and its association with incident asthma in a Swedish child cohort study. Indoor air 20(6), 494-501**
Participant characteristics	Building characteristics: Location: urban Dwelling type: Not reported Building age: Not reported Type of ownership/tenancy: Not reported Parental characteristics: Age: Not reported Current smoker (mother): 55 (54%) Hay fever: Not reported Atopy: Not reported but all mothers had asthma
Inclusion criteria	
Exclusion criteria	Diagnosis of asthma at baseline
Type of pollutant/exposure	Phthalates in house dust (PVC flooring used as proxy)
Pollutant/exposure assessment	Self-report of use of PVC flooring
Outcome	Doctor diagnosed asthma (incident)
Results	aOR (95%CI) PVC flooring in child's bedroom: 1.52 (0.99, 2.35) PVC flooring in parent's bedroom: 1.46 (0.96, 2.23) Multi-family house: 1.48 (0.86, 2.57)
Follow up	5 years
Newcastle-Ottawa Scale	Selection Representativeness of the exposed cohort • truly representative of the average child in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • written self-report Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for smoking in the home • study controls for any additional factor s Outcome Assessment of outcome • record linkage Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • Unlikely to introduce bias **Overall assessment=Low**

Bibliographic reference	**Larsson M, Hagerhed-Engman L, Kolarik B et al (2010) PVC as flooring material and its association with incident asthma in a Swedish child cohort study. Indoor air 20(6), 494-501**
Source of funding	**Government:** Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas), Swedish Asthma and Allergy Association's Research Foundation, and the Swedish Foundation for Health Care Sciences and Allergy Research.
Comments	None

D.1.68 Lau 2000

<table>
<tr><th>Bibliographic reference</th><th colspan="3">Lau S, Illi S, Sommerfeld C, et al (2000) Early exposure to house-dust mite and cat allergens and development of childhood asthma: A cohort study. Lancet 356(9239), 1392-1397</th></tr>
<tr><td>Study design</td><td colspan="3">Prospective cohort study</td></tr>
<tr><td>Objective</td><td colspan="3">To examine the relationship between indoor allergen exposure and the development of asthma at 7 years of age</td></tr>
<tr><td>Setting/Study location</td><td colspan="3">Germany</td></tr>
<tr><td>Number of participants</td><td colspan="3">1314 children</td></tr>
<tr><td>Selected population</td><td colspan="3">Yes – selected as being at high risk for asthma</td></tr>
<tr><td>Participant characteristics</td><td colspan="2">Description
Sex
Age (years)
Ethnicity
Education
SES
Building characteristics</td><td>
Not reported
Not reported
Not reported
Not reported
Not reported
Not reported</td></tr>
<tr><td>Inclusion criteria</td><td colspan="3">At risk of asthma</td></tr>
<tr><td>Exclusion criteria</td><td colspan="3">Not reported</td></tr>
<tr><td>Type of pollutant/exposure</td><td colspan="3">House dust mite and cat allergen</td></tr>
<tr><td>Pollutant/exposure assessment</td><td colspan="3">Parents collected dust samples according to detail ed instructions</td></tr>
<tr><td>Outcome</td><td colspan="3">Wheezing
Physician-diagnosed asthma</td></tr>
<tr><td rowspan="6">Results</td><td colspan="3">Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between exposure to house dust mite, cat allergen, wheeze and asthma</td></tr>
<tr><td></td><td>Current wheeze</td><td>Asthma diagnosed by a doctor</td></tr>
<tr><td></td><td>aOR (95%CI)</td><td>aOR (95%CI)</td></tr>
<tr><td colspan="3">Cat allergen exposure (Fel d1)</td></tr>
<tr><td>0.216 – 47μg/g</td><td>1.47 (0.72, 1.26)</td><td>1.52 (0.64, 2.62)</td></tr>
<tr><td colspan="3">Mite allergen exposure (Der p1 + Der f1)</td></tr>
</table>

Bibliographic reference	**Lau S, Illi S, Sommerfeld C, et al (2000) Early exposure to house-dust mite and cat allergens and development of childhood asthma: A cohort study. Lancet 356(9239), 1392-1397**		
	0.981 - 240µg/g	1.03 (0.52, 2.04)	0.72 (0.26, 2.00)
Follow up	7 years		
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • selected group of children at high risk of asthma Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • Objective sampling Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for family history of atopy • study controls for social status Outcome Assessment of outcome • independent blind assessment Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias – Low**		
Source of funding	**Government:** German Ministry of Research and Education		
Comments			

D.1.69 Le Moual 2012

Bibliographic reference	**Le Moual N, Varraso R, Siroux V, et al(2012) Domestic use of cleaning sprays and asthma activity in females. The European respiratory journal 40(6), 1381-9**	
Study design	Prospective cohort study	
Objective	To assess, the associations between home cleaning, particularly the use of household cleaning sprays, and asthma activity	
Setting/Study location	France	
Number of participants	683 adult women	
Selected population	Yes – only women with asthma and the first degree relatives included but this study focuses on 683 women	
Participant characteristics	Description	

Bibliographic reference	Le Moual N, Varraso R, Siroux V, et al(2012) Domestic use of cleaning sprays and asthma activity in females. The European respiratory journal 40(6), 1381-9		
	Sex		
	Female	683 (100%)	
	Age (years) Mean (SD)	43.8 (15.5)	
	Ethnicity	Not reported	
	Education		
	Primary	154 (22.6%)	
	Secondary	177 (26.0%)	
	University	350 (51.4$)	
	SES	Not reported	
	Building characteristics	Not reported	
Inclusion criteria	Had detailed information regarding domestic exposures, in particular to sprays, was collected in 2003–2007		
Exclusion criteria	Not reported		
Type of pollutant/exposure	Domestic use of cleaning sprays		
Pollutant/exposure assessment	Current domestic exposures (last 12 months) were based on 24 domestic exposure variables including nine cleaning tasks and 15 cleaning agents Exposure to sprays was defined by the exposure to any of the eight types of sprays (furniture, glass-cleaning, carpet, mopping the floor, oven, ironing, air-refreshing, other use) at least once a week.		
Outcome	Asthma		
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between domestic self-reported exposure to cleaning products and asthma.		

	Current asthma	Controlled asthma	Poorly controlled asthma
Home cleaning ≥1 day/week	1.34 (0.87, 2.05)	1.12 (0.66–1.90)	1.50 (0.88–2.52)
1 type of spray used ≥1 day/week	0.68 (0.44, 1.04)	0.67 (0.38–1.18)	0.65 (0.38–1.12)
≥ 2 types of sprays used ≥1 day/week	1.67 (1.08, 2.56)	1.32 (0.75–2.34)	2.04 (1.25–3.32)

Follow up	12 months
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • selected group of women Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • questionnaire Demonstration that outcome of interest was not present at start of study • No Comparability Comparability of cohorts on the basis of the design or analysis

Bibliographic reference	**Le Moual N, Varraso R, Siroux V, et al(2012) Domestic use of cleaning sprays and asthma activity in females. The European respiratory journal 40(6), 1381-9**
	• study controls for smoking habits • study controls for any additional factors - age, , body mass index and occupational exposure. Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias: High** (Concerns over self-report of exposure and outcomes)
Source of funding	**Government:** French Agency of Health Safety, Environment and Work; National Research Agency - Health Environment, Health-Work Program Industry: Merck Sharp & Dohme; Hospital Program of Clinical Research (PHRC)-Paris
Comments	

D.1.70 Li 2006

Bibliographic reference	**Li R, Weller E, Dockery DW, et al. (2006) Association of indoor nitrogen dioxide with respiratory symptoms in children: application of measurement error correction techniques to utilize data from multiple surrogates. J Expo Sci Environ Epidemiol 16(4): 342-50.**
Study design	Prospective cohort study
Objective	To evaluate the effect of indoor nitrogen dioxide exposure on the annual risk of lower respiratory tract symptoms
Setting/Study location	Different communities, USA
Number of dwellings and participants	Number of dwellings: 1,137 Number of participants: 1,137 children
Selected population	No
Building and Participant characteristics	Building characteristics: Location: unclear Dwelling type: not reported Building age: not reported Type of ownership/tenancy: not reported Participant characteristics: Age: not reported Smokers living in the property: 13% Allergies: not reported Parental history of asthma: 13%

Bibliographic reference	**Li R, Weller E, Dockery DW, et al. (2006) Association of indoor nitrogen dioxide with respiratory symptoms in children: application of measurement error correction techniques to utilize data from multiple surrogates. J Expo Sci Environ Epidemiol 16(4): 342-50.**
Inclusion criteria	Households of children between 7 and 11 years, living in 6 different communities across the USA were included.
Exclusion criteria	Not reported
Building factor/exposure	Gas stove with a pilot light, gas stove without a pilot light, stove heater, Fan, wood stove, number of rooms in the home, kerosene heater
Building factor/exposure assessment	Building factors were ascertained by asking participants to complete a self-reported questionnaire.
Outcome	Lower respiratory tract symptoms (not specified/defined)
Results	Building characteristic — Odds ratio (95%CI) Gas stove, no pilot — 0.68 (0.42, 1.10) Gas stove, pilot — 1.54 (0.94, 2.25) Stove heater — 1.61 (1.05, 2.47) Fan — 0.93 (0.81, 1.07) Wood stove — 0.91 (0.66, 1.25) Kerosene heater — 1.41 (0.96, 2.07) Per room increase in the household — 0.99 (0.92, 1.06)
Follow up	Up to 2.5 years
Study methods	Methods: A respiratory symptom questionnaire was administered at the time of enrolment. A year later, a second questionnaire and pulmonary function examination were administered. Between 12 and 18 months later, a final health questionnaire was administered. A third of the population was selected by stratified random sampling (accounting for smoking, and main source of nitrogen dioxide) to have their household air quality monitored. Based on residential indoor air quality, an annual average nitrogen dioxide measurement was obtained. Statistical analysis: multivariate logistic regression was performed to assess associations
Newcastle-Ottawa Scale	Selection Representativeness of the exposed cohort • no description of the derivation of the cohort Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • self-reported Demonstration that outcome of interest was not present at start of study • No Comparability Comparability of cohorts on the basis of the design or analysis • study controls for single marital status, higher education status, parental history of bronchitis or emphysema, parental history of asthma, gender, age, and the total packs of cigarette smoking inside the child's home Outcome

Bibliographic reference	**Li R, Weller E, Dockery DW, et al. (2006) Association of indoor nitrogen dioxide with respiratory symptoms in children: application of measurement error correction techniques to utilize data from multiple surrogates. J Expo Sci Environ Epidemiol 16(4): 342-50.**
	Assessment of outcome • self-reported Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias: high** (Concerns over self-report of exposure and outcome
Source of funding	**Government:** National Institute of Environmental Health Sciences (NIEHS)
Comments	None

D.1.71 Li 2016

Bibliographic reference	**Li W, Dorans K S, Wilker E H et al. (2016) Residential Proximity to Major Roadways, Fine Particulate Matter, and Adiposity: The Framingham Heart Study. Obesity 24, 2593-2599**		
Study design	Prospective cohort study		
Objective	To examine the associations of residential-based estimates of ambient $PM_{2.5}$ exposure and proximity to the nearest major roadway with body mass index (BMI) and MDCT-based measures of abdominal adiposity		
Setting/Study location	United States		
Number of participants	2,372 adults		
Selected population	No		
Participant characteristics	Description	No.	%
	Sex	Not reported	Not reported
	Age (years); mean (SD)	53.9	11.8
	Ethnicity		
	Cases/selected population/comorbidity		
	Cardiovascular disease	192	8.1
	Diabetes	173	7.3
	Socio-economic status		
	Education		
	<High school	41	1.7
	High school	521	22.0
	Some college	771	32.5
	College graduate	1,039	43.8
	Building characteristics	Not reported	Not reported
Inclusion criteria	Men aged ≥ 35 years old Women were aged ≥ 40 years old and not pregnant Because of physical constraints of the scanner, all participants weighed <350 lbs (160 kg)		

Bibliographic reference	**Li W, Dorans K S, Wilker E H et al. (2016) Residential Proximity to Major Roadways, Fine Particulate Matter, and Adiposity: The Framingham Heart Study. Obesity 24, 2593-2599**	
Study design	Prospective cohort study	
Exclusion criteria		
Type of pollutant/exposure	PM 2.5 and proximity to the nearest major roadway	
Pollutant/exposure assessment	Authors used a spatial-temporal model to estimate $PM_{2.5}$ concentrations at a 1 X 1 km2 resolution based on residential addresses.	
Outcome	Obesity	
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association of distance to a major roadway and $PM_{2.5}$ with adiposity measures. We defined major roadways as primary highways with limited access (A1), primary roads without limited-access (A2), or secondary and connecting roads (A3). And we estimated residential distance to the nearest major roadway based on the geocoded addresses.	
		Obesity
		OR (95%CI)
	Closer to a major roadway	1.10 (0.97; 1.25)
	2003 annual average $PM_{2.5}$	1.01 (0.92,1.12)
Follow up	Not reported	
Study methods	Both standing height and weight were measured without shoes according to a standardized protocol. Height was recorded to the nearest 1/4 inch, and weight was recorded to the nearest pound (rounded up if ≥0.5 pound). Body mass index (BMI) was calculated as weight (kg)/ height (m)2 Authors fit multivariable linear regression models for continuous BMI, subcutaneous adipose tissue (SAT), and visceral adipose tissue (VAT), and multivariable logistic regression models for a binary indicator of obesity (BMI ≥30 kg/m2) adjusting for confounding factors	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average adult population in the community Selection of the non-exposed cohort • no description of the derivation of the non-exposed cohort Ascertainment of exposure • validated measurement used Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for age, sex, smoking, alcohol intake, educational level; physical activity, medication use and household income Outcome Assessment of outcome • Validated measurement used Was follow-up long enough for outcomes to occur • Yes	

Bibliographic reference	**Li W, Dorans K S, Wilker E H et al. (2016) Residential Proximity to Major Roadways, Fine Particulate Matter, and Adiposity: The Framingham Heart Study. Obesity 24, 2593-2599**
Study design	Prospective cohort study
	Adequacy of follow up of cohorts • no statement **Overall risk of bias: low**
Source of funding	**Government:** USEPA , National Heart, Lung, and Blood Institute of the National Institutes of Health, National Institutes of Environmental Health Sciences
Comments	

D.1.72 Lindgren 2013

Bibliographic reference	**Lindgren A, Stroh E, Bjork J, et al (2013) Asthma incidence in children growing up close to traffic: a registry-based birth cohort. Environmental health : a global access science source 12, 91**		
Study design	Prospective cohort study		
Objective	to investigate if children growing up close to high traffic intensity are at higher risk of developing asthma or other obstructive respiratory disease in early childhood		
Setting/Study location	Sweden		
Number of participants	7898		
Selected population	No		
Participant characteristics	Description	No.	%
	Sex Male Female Missing	 3784 3996 118	 49 51
	Maternal age (years)	Not reported	
	Ethnicity	Not reported	
	Parental allergy Yes No Missing	 3177 3751 970	 46 54
	Parental education ➢ 12 years ➢ 9 – 12 years ➢ ≤ 9 years ➢ Missing	 5612 1792 297 197	 73 23 4
	Annual family income	Not reported	
	Building characteristics Owned house Tenant-owned apartment	 2783 2242	 36 29

Bibliographic reference	**Lindgren A, Stroh E, Bjork J, et al (2013) Asthma incidence in children growing up close to traffic: a registry-based birth cohort. Environmental health : a global access science source 12, 91**		
	Rented apartment	2616	34
	Other	101	1
	Missing	156	
Inclusion criteria	Children born in Scania Mothers registered as living in the municipalities Malmö, Svedala, Vellinge or Trelleborg		
Exclusion criteria	Not registered in Scania Address for birth year not registered No Child Health Care centers		
Type of pollutant/exposure	Proximity to traffic		
Pollutant/exposure assessment	To assess exposure to traffic, we identified the road with the heaviest traffic intensity within 100 m of the residence. Traffic intensity was categorized as “no road”, “road with 0–2880 cars/day”, “2880–8640 cars/day”, “8640–14400 cars/day”, and “≥14400 cars/day”, based upon daily (24-hour) mean levels.		
Outcome	Asthma, bronchiolitis, obstructive bronchitis		
Results	Adjusted hazard ratios (aHRs) and 95% confidence intervals (CIs)		

	Bronchiolitis	Obstructive bronchitis	Asthma
	aHR (95%CI)	aHR (95%CI)	aHR (95%CI)
Heaviest road ≤100 m, birth address			
0–8640 cars/day	1.00	1.00	1.00
≥8640 cars/day	0.7 (0.6, 0.9)	1.0 (0.9,1.2)	0.7 (0.6, 0.9)
Heaviest road ≤100 m, never moved			
0–8640 cars/day	1.00	1.00	1.00
≥8640 cars/day	0.7 (0.6, 0.9)	1.0 (0.8,1.2)	0.7 (0.6, 0.9)

Follow up	Up to 6 years
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average child in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • Objective report Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for sex, birth weight, smoking during pregnancy, environmental tobacco smoke (ETS), mold at home, parental allergy, furred pets at home, breastfeeding, parental origin, parental education, problems to pay bills, type of housing, and birth year. Outcome

Bibliographic reference	**Lindgren A, Stroh E, Bjork J, et al (2013) Asthma incidence in children growing up close to traffic: a registry-based birth cohort. Environmental health : a global access science source 12, 91**
	Assessment of outcome • record linkage Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias: Low**
Source of funding	**Government:** Swedish Council for Working Life and Social Research **Academic:** Faculty of Medicine, Lund University, Sweden.
Comments	

D.1.73 Litonjua 2002

Bibliographic reference	**Litonjua AA, Milton DK, Celedon JC, et al (2002) A longitudinal analysis of wheezing in young children: The independent effects of early life exposure to house dust endotoxin, allergens, and pets. Journal of Allergy and Clinical Immunology 110(5), 736-742**	
Study design	Prospective cohort study	
Objective	to examine the longitudinal association of exposure to HDE, allergen levels, and the presence of a dog in the home and wheezing over a 4- year period.	
Setting/Study location	United States	
Number of participants	226 children	
Selected population	Yes –family history of atopy	
Participant characteristics	Description	
	Sex	
	Female	117 (51.8%)
	Male	109 (48.2%)
	Age (years) – Median (range)	
	Ethnicity	2.87 (1.10-4.99)
	White	186 (82.3%)
	Black	18 (8.0%)
	Hispanic	13 (5.8%)
	Asian	9 (4.0%)
	Education	Not reported
	SES (by percentage of households below poverty,)	
	<10%	167 (73.9%)
	10%-<20%	46 (20.4%)
	≥20%	13 (5.8%)
	Building characteristics	Not reported

Bibliographic reference	**Litonjua AA, Milton DK, Celedon JC, et al (2002) A longitudinal analysis of wheezing in young children: The independent effects of early life exposure to house dust endotoxin, allergens, and pets. Journal of Allergy and Clinical Immunology 110(5), 736-742**	
Inclusion criteria	Parents allergic to house dust or house dust mites, cockroaches, pollens, animals, or mould	
Exclusion criteria	Not reported	
Type of pollutant/exposure	Pets at home	
Pollutant/exposure assessment	Objective sampling of house dust for allergens	
Outcome	Wheeze	
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between pets at home and repeated wheeze	
		Repeated wheeze
		aOR (95%CI)
	Dog in the home	0.12 (0.01-0.97)
	Fel d 1 ≥1 µg/g	0.61 (0.27-1.35)
Follow up	4 years	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • selected group of children at risk of asthma Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • Objective sampling Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for maternal asthma • study controls for any additional factors as follows - maternal age, sex, prematurity, area of residence, and clustering of outcomes. Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias – Moderate** (concerns over self-report of outcomes)	
Source of funding	**Government:** National Institute of Allergy and Infectious Disease; National Institute for Environmental Health Science	
Comments		

D.1.74 Lynch 2014

Bibliographic reference	Lynch S V, Wood R A, Boushey H et.al (2014) Effects of early-life exposure to allergens and bacteria on recurrent wheeze and atopy in urban children. The Journal of allergy and clinical immunology 134(3), 593-601.e12	
Study design	Prospective cohort study	
Objective	To determine whether early-life exposure to house dust obtained from inner-city homes is associated with development of allergic sensitization and wheezing	
Setting/Study location	United States	
Number of participants	560 children	
Selected population	Yes – high risk for atopy	
Participant characteristics	Description	
	Sex	
	Male	240 (51%)
	Age (years) – Median (range)	
	Ethnicity	
	Black	333 (71%)
	Hispanic	92 (20%)
	Other	42 (9%)
	Education (mother complete high school)	273 (55%)
	SES by household income)	
	<$15,000	321 (69%)
	Building characteristics	Not reported
Inclusion criteria	Residence in an area with more than 20% of residents below the poverty level Mother or father with allergic rhinitis, eczema, and/or asthma Birth at 34 weeks' gestation or later	
Exclusion criteria	Not reported	
Type of pollutant/exposure	Pets and dust mite	
Pollutant/exposure assessment	Household dust samples from the living room (chair or sofa and floor) and child's bedroom (mattress and floor) were collected	
Outcome	Aeroallergen sensitization - defined by a wheal 3mm or more, larger than that elicited by the saline control on skin prick testing or a specific IgE level of 0.35 kU/L or greater. Recurrent wheeze was defined as parental report of at least 2 wheezing episodes, with at least 1 episode occurring in the third year. Eczema was defined as a score of 1.0 or greater on the Eczema Area and Severity Index14 at age 3 years.	

Bibliographic reference	**Lynch S V, Wood R A, Boushey H et.al (2014) Effects of early-life exposure to allergens and bacteria on recurrent wheeze and atopy in urban children. The Journal of allergy and clinical immunology 134(3), 593-601.e12**	
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between pets at home and repeated wheeze	
		Recurrent wheeze
	for 1-log increase in allergen level.	aOR (95%CI)
	Fel d 1	0.71 (0.58, 0.88)
	Can f 1	1.00 (0.79, 1.28)
	Der f 1	0.92 (0.73, 1.15)
Follow up	2 years	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • selected group of children in inner city Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • Objective sampling Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for environmental tobacco smoke • study controls for additional factor as follows, age, sex, and stress Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias – Moderate** (some concerns over self-report of outcomes)	
Source of funding	**Government:** National Institute of Allergy and Infectious Diseases, National Institutes of Health, National Center for Advancing Translational Sciences, National Institutes of Health	
Comments		

D.1.75 McConnell 2002

Bibliographic reference	**McConnell R, Berhane K, Gilliland F et.al (2002) Indoor risk factors for asthma in a prospective study of adolescents. Epidemiology 13(3), 288-295**
Study design	Prospective cohort study

Bibliographic reference	**McConnell R, Berhane K, Gilliland F et.al (2002) Indoor risk factors for asthma in a prospective study of adolescents. Epidemiology 13(3), 288-295**		
Objective	To determine the association of indoor exposures with the development of asthma among adolescents and children entering adolescence		
Setting/Study location	United States		
Number of participants	3535 children with no history of asthma		
Selected population	No		
Participant characteristics	Description	No.	%
	Sex		
	Male	396	23.6
	Female	387	20.8
	Age (years)		
	< 9	236	21.7
	9 - 11	279	23.0
	> 11	241	21.7
	Ethnicity		
	White	520	25.1
	Black	30	17.1
	Asian	17	9.0
	Hispanic	190	19.8
	Other	26	25.0
	(Maintenance) medication use	Not reported	Not reported
	Parental asthma and/or atopic	Not reported	Not reported
	Parental education (years)	Not reported	Not reported
	Annual family income	Not reported	Not reported
	Building characteristics	Not reported	Not reported
Inclusion criteria	Children from schools in neighbourhoods with stable middle income populations		
Exclusion criteria	Children diagnosed with asthma History of cystic fibrosis Severe chest injury or chest surgery		
Type of pollutant/exposure	Pet dander Mould/mildew Gas stove		
Pollutant/exposure assessment	Information on characteristics of the child's home environment was collected in a baseline questionnaire. This includes the presence of water damage, mould or mildew and the use of combustion sources.		
Health outcome	Asthma defined by wheezing		
Results	Adjusted relative risks (aRRs) and 95% confidence intervals (CIs) for indoor exposures and the risk of asthma by baseline history of wheeze		

Bibliographic reference	**McConnell R, Berhane K, Gilliland F et.al (2002) Indoor risk factors for asthma in a prospective study of adolescents. Epidemiology 13(3), 288-295**		
		Asthma with wheeze	Asthma with no wheeze
		aRR (95%CI)	aRR (95%CI)
	Any pet	1.10 (0.60, 2.00)	1.60 (1.00, 2.50)
	Water damage	0.80 (0.50, 1.40)	1.4 (0.90, 2.00)
	Mould/mildew	0.60 (0.40, 0.90)	1.10 (0.80, 1.60)
	Wood fire	0.90 (0.60, 1.50)	0.90 (0.60, 1.30)
	Gas stove	1.20 (0.70, 2.00)	1.3 (0.80, 2.00)
Follow up	5 years		
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average child in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • Questionnaire and objective samples taken Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for family history of asthma • study controls for any additional factor – gender, age, race and ethnicity, community of residence, , child's history of allergy, membership in a health insurance plan, and high or low socioeconomic status (SES) compared with middle-income families. Outcome Assessment of outcome • record linkage Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias – Low**		
Source of funding	**Government:** California Air Resources Board, the National Institutes of Environmental Health Sciences, the Environmental Protection Agency, the National Heart, Lung and Blood Institute **Charity:** Hastings Foundation		
Comments	Authors suggest that furry pets are a common and potentially remediable risk factor for new onset asthma in adolescents.		

D.1.761 McConnell 2006

Bibliographic reference	**McConnell R, Berhane K, Yao L et.al (2006) Traffic, susceptibility, and childhood asthma. Environmental health perspectives 114(5), 766-72**		
Study design	Prospective cohort study		
Objective	To examine characteristics that might increase childhood susceptibility to the effects of traffic-related air pollution		
Setting/Study location	United States		
Number of participants	5,341 children		
Selected population	No		
Participant characteristics	Description	No.	%
	Sex (male)	2,425	51
	Age (years)	Not reported	Not reported
	Ethnicity		
	North American Indian	44	0.93
	Asian	170	3.6
	Black	197	4.2
	Hispanic white	2,617	55
	Non-Hispanic white	1,682	35
	Other	32	0.67
	Cases/selected population/comorbidity	Not reported	Not reported
	Socio-economic status		
	Parental education		
	< 12th grade	982	22
	Grade 12	880	20
	Some post-high school	1,681	38
	Four years of college	512	11
	Some postgraduate	417	9.3
	Building characteristics		
	Water damage	653	14
	Mould or mildew	1,068	25
Inclusion criteria	Not reported		
Exclusion criteria	Not reported		
Type of pollutant/exposure	Proximity to a major road		
Pollutant/exposure assessment	Authors estimated distance of each participant's residence to the nearest major road, including freeways, other highways, and arterial roads. Participant residence addresses were standardized, and their locations were geocoded to 13 m perpendicular to the side of the adjacent road, using the Tele Atlas Multinet road network data		
Outcome	Asthma and wheeze		
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between proximity to a major road, asthma and wheeze		

Bibliographic reference	**McConnell R, Berhane K, Yao L et.al (2006) Traffic, susceptibility, and childhood asthma. Environmental health perspectives 114(5), 766-72**			
		Lifetime asthma	Prevalent asthma	Current wheeze
	Major road distance (metres)	aOR (95%CI)	aOR (95%CI)	aOR (95%CI)
	> 300	1.00	1.00	1.00
	150–300	0.92 (0.73–1.15)	1.04 (0.82, 1.33)	1.02 (0.82, 1.27)
	75–150	1.06 (0.82–1.36)	1.33 (1.02, 1.72)	1.30 (1.02, 1.66)
	< 75	1.29 (1.01–1.66)	1.50 (1.16, 1.95)	1.40 (1.09, 1.78)
Follow up	5 years			
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average child in the community Selection of the non-exposed cohort • no description of the derivation of the non-exposed cohort Ascertainment of exposure • written self-report (questionnaire) Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for child's age, sex, race, community, and language of questionnaire completion Outcome Assessment of outcome • record linkage • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • subjects lost to follow up unlikely to introduce bias **Overall risk of bias: Low**			
Source of funding	**Government:** National Institute of Environmental Health Science the U.S. Environmental Protection Agency, (the Southern California Particle centre)], the South Coast Air Quality Management District, the National Heart, Lung, and Blood Institute **Charity:** Hastings Foundation.			
Comments				

D.1.77 McCormack 2009

Bibliographic reference	**McCormack MC, Breysse PN, Matsui EC, et al (2009) In-Home Particle Concentrations and Childhood Asthma Morbidity. Environmental Health Perspectives 117(2), 294-298**
Study design	Prospective cohort

Bibliographic reference	**McCormack MC, Breysse PN, Matsui EC, et al (2009) In-Home Particle Concentrations and Childhood Asthma Morbidity. Environmental Health Perspectives 117(2), 294-298**	
Objective	To investigate the effect of in-home coarse and fine PM on respiratory symptoms, rescue medication use, and acute health care use among preschool asthmatic children	
Setting/Study location	United States	
Number of participants	150	
Selected population	Yes – all had asthma	
Participant characteristics	Description	
	Sex	(58%)
	Age (years); mean (Range)	4.4 (2–6)
	Ethnicity	
	African American 91	(91%)
	Caucasian	(5%)
	Other	(4%)
	Cases/selected population/comorbidity	
	Socio-economic status (reported as Caregiver education level)	
	Eighth grade/some high school	(38%)
	High school	(43%)
	Some college	(19%)
Inclusion criteria	Participants had to report a physician diagnosis of asthma and had to have symptoms of asthma and/or medication use for asthma in the previous 6 months. Other inclusion criteria were age between 2 and 6 years and residence within one of nine contiguous ZIP codes within East Baltimore.	
Exclusion criteria	Not reported	
Type of pollutant/exposure	P2,5 and PM 10.0	
Pollutant/exposure assessment	A trained environmental technician completed home visits. Environmental monitoring was carried out at baseline and at 3 and 6 months. At each time period, integrated air sampling in the child's bedroom over a 3-day period was performed.	
Outcome		
Results	Adjusted Incident rate ratios (aHRs) and 95% confidence intervals (CIs)	
	$PM_{2.5}$ –10 (per 10 μg/m^3 increase)	aIRR (95%CI)
	Cough, wheezing, chest tightness	1.06 (1.01, 1.12)
	Slow down	1.08 (1.02, 1.14)
	Symptoms with running	1.00 (0.94, 1.08)
	Nocturnal symptoms	1.08 (1.01, 1.14)
	Limited speech	1.11 (1.03, 1.19)
	Rescue medication use	1.06 (1.01, 1.10)

Bibliographic reference	**McCormack MC, Breysse PN, Matsui EC, et al (2009) In-Home Particle Concentrations and Childhood Asthma Morbidity. Environmental Health Perspectives 117(2), 294-298**	
	$PM_{2.5}$ (per 10 µg/m^3 increase)	aIRR (95%CI)
	Cough, wheezing, chest tightness	1.03 (0.99, 1.07)
	Slow down	1.04 (1.0, 1.09)
	Symptoms with running	1.07 (1.02,1.11)
	Nocturnal symptoms	1.06 (1.01, 1.10)
	Limited speech	1.07 (1.00, 1.14)
	Rescue medication use	1.04 (1.01, 1.08)
Follow up		
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average child with asthma population in the community Selection of the non-exposed cohort • no description of the derivation of the non-exposed cohort Ascertainment of exposure • validated measurement used Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for age, sex, race, parent education level, season, indoor fine PM, ambient fine PM, ambient coarse PM. Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • people lost to follow up unlikely to introduce bias **Overall risk of bias: Moderate** (concerns over self-reported of outcomes)	
Source of funding	**Government:** National Institute of Environmental Health Sciences (NIEHS); U.S. Environmental Protection Agency **Academic:** Johns Hopkins NIEHS Center in Urban Environmental Health	
Comments		

D.1.78 Mahalingaiah 2014

Bibliographic reference	**Mahalingaiah S, Hart JE, Laden F, et al (2014) Air pollution and risk of uterine leiomyomata. Epidemiology (Cambridge, and Mass.) 25(5), 682-8**	
Study design	Prospective cohort study	
Objective	To examine if air pollution exposure is associated with the occurrence of uterine leiomyomata	
Setting/Study location	United States	
Number of participants	85251 women	
Participant characteristics	Description	No. (%)
	Sex Female	 85251 (100%)
	Age (years); mean (SD)	42.6 (5.3%)
	Ethnicity Caucasian	 (24%)
	SES	Not reported
Inclusion criteria	alive at the given questionnaire cycle, premenopausal, free of cancer (other than non-melanoma skin cancer), had no history of infertility, had intact uteri, and did not have a diagnosis of uterine leiomyomata prior to 1993	
Exclusion criteria	More than 1 home address in continental US	
Type of pollutant/exposure	Proximity to traffic	
Pollutant/exposure assessment	Authors calculated distance to road at each residential address as a proxy for all exposures related to traffic. Distance to road (in meters) for all available nurses' addresses was determined using geographic information system (GIS) software (ArcGIS, version 9.2; ESRI, Redlands, CA) and the ESRI StreetPro 2007 data layer.	
Outcome	uterine leiomyomata	
Results	Adjusted hazard ratios (aHRs) and 95% confidence intervals (CIs)	
		Uterine leiomyomata
	Distance to A1–A3 roadway (metres)	aHR (95%CI)
	0–50 51–199 > 200	1.01 (0.93, 1.09) 1.04 (0.98, 1.11) Reference
	Distance to A1–A2 roadway (metres)	
	0–50 51–199 > 200	1.00 (0.80, 1.25) 1.02 (0.91, 1.15) Reference
Follow up	14 years	

Bibliographic reference	Mahalingaiah S, Hart JE, Laden F, et al (2014) Air pollution and risk of uterine leiomyomata. Epidemiology (Cambridge, and Mass.) 25(5), 682-8
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort a) truly representative of the average female population in the community Selection of the non-exposed cohort b) no description of the derivation of the non-exposed cohort Ascertainment of exposure c) validated measurement used Demonstration that outcome of interest was not present at start of study d) Yes Comparability Comparability of cohorts on the basis of the design or analysis e) study controls for age, race, region, body mass index, smoking status, parity, oral contraceptive use, age at menarche Outcome Assessment of outcome f) self-report Was follow-up long enough for outcomes to occur g) Yes Adequacy of follow up of cohorts h) people lost to follow up unlikely to introduce bias **Overall risk of bias: low**
Source of funding	**Government:** National Institute of Child Health and Human Development, National Cancer Institute, National Institute for Environmental Health Sciences **Academic**: Boston University Department of Obstetrics and Gynecology, and the Massachusetts Institute of Technology Center for Environmental Health Sciences Translational Pilot Project Program
Comments	

D.1.79 Mahalingaiah 2016

Bibliographic reference	Mahalingaiah S, Hart J E, Laden F, et al (2016) Adult air pollution exposure and risk of infertility in the Nurses' Health Study II. Human reproduction (Oxford, and England) 31(3), 638-47
Study design	Prospective cohort study
Objective	To assess the relation between incident infertility and air pollution exposures as measured by exposure to PM less as well as traffic-related exposure measured by distance to road

Bibliographic reference	**Mahalingaiah S, Hart J E, Laden F, et al (2016) Adult air pollution exposure and risk of infertility in the Nurses' Health Study II. Human reproduction (Oxford, and England) 31(3), 638-47**		
Setting/Study location	United States		
Number of participants	36 294 women		
Participant characteristics	Description	No.	%
	Sex	All female	All female
	Age (years); mean (SD)	38.7 (4.7)	-
	Ethnicity		
	Caucasian	107115.6	92
	Cases/selected population/comorbidity	Not reported	Not reported
	Socio-economic status	Not reported	Not reported
	Building characteristics	Not reported	Not reported
Inclusion criteria	Not reported		
Exclusion criteria	Women were excluded from the current study if by 1993 they were Over 45 years of age No longer responded to questionnaires Had undergone a hysterectomy or tubal ligation Had previously been diagnosed with cancer (other than skin cancer) Were under 45 years of age and menopausal Had a partner who had undergone a vasectomy Had previously reported infertility		
Type of pollutant/exposure	Proximity to traffic and particulate matter (PM)		
Pollutant/exposure assessment	Authors calculated distance to road at each residential address as a proxy for all exposures related to traffic. Distance to road (in meters) for all available nurses' addresses was determined using geographic information system (GIS) software (ArcGIS, version 9.2; ESRI, Redlands, CA) and the ESRI StreetPro 2007 data layer.		
Outcome	Infertility		
Results	Adjusted hazard ratios (aHRs) and 95% confidence intervals (CIs) for association between proximity to traffic PM and infertility		
		Infertility	
		aHR (95%CI)	
	Distance to A1–A3 roadway (metres)		
	0–199	1.11 (1.02, 1.20)	
	200+	Ref	
	PM cumulative average exposure (Per 10 mg/m^3 increase)		
	PM_{10}	1.06 (0.99, 1.13)	
	$PM_{2.5}$ – 10	1.10 (0.99, 1.22)	
	$PM_{2.5}$	1.05 (0.93, 1.20)	

Bibliographic reference	Mahalingaiah S, Hart J E, Laden F, et al (2016) Adult air pollution exposure and risk of infertility in the Nurses' Health Study II. Human reproduction (Oxford, and England) 31(3), 638-47
Follow up	14 years
Study methods	On the baseline questionnaire and each follow-up questionnaire, women were asked to report if they had attempted to become pregnant for at least 1 year without success, the age at which this occurred and, if known, the reason or reasons for the infertility. Time-varying Cox proportional hazards models were used to assess the association of incidence of overall infertility or specific reasons for infertility with exposure to roadway proximity or each size fraction of PM. Authors examined possible confounding by numerous a priori selected risk factors for infertility or predictors of exposure including
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average female population in the community Selection of the non-exposed cohort • no description of the derivation of the non-exposed cohort Ascertainment of exposure • validated measurement used Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for age, race, region, body mass index, smoking status, parity, oral contraceptive use, age at menarche Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • people lost to follow up unlikely to introduce bias **Overall risk of bias: low**
Source of funding	**Government:** Reproductive Scientist Development Program, and the Building Interdisciplinary Research Careers in Women's Health, National Institute of Child Health and Human Development and the Massachusetts Institute of Technology Centre for Environmental Health Sciences Translational Pilot Project Program, National Cancer Institute, National Institute for Environmental Health Sciences, Eunice Kennedy Shriver National Institute of Child Health and Human Development **Academic**: Boston University CTS, Boston University Department of Obstetrics and Gynaecology, S.A.M
Comments	

D.1.80 Mommers 2005

Bibliographic reference	**Mommers M, Jongmans-Liedekerken A W, Derkx R et.al (2005) Indoor environment and respiratory symptoms in children living in the Dutch-German borderland. International journal of hygiene and environmental health 208(5), 373-81**				
Study design	Nested case-control				
Objective	To investigate the role of indoor environmental risk factors on respiratory symptoms in 7-8 year old children living in the Dutch-German borderland				
Setting/Study location	Germany and The Netherlands				
Number of participants	1562 children				
Selected population	No				
Participant characteristics	Description	German children		Dutch children	
		Control	Cases	Control	Cases
		No. %	No.%	No. %	No. %
	Sex	Not reported	Not reported	Not reported	Not reported
	Age (years)	Not reported	Not reported	Not reported	Not reported
	Ethnicity	Not reported	Not reported	Not reported	Not reported
	Maintenance medication use	Not reported	Not reported	Not reported	Not reported
	Parental asthma and/or atopic	Not reported	Not reported	Not reported	Not reported
	Parental education	Not reported	Not reported	Not reported	Not reported
	Annual family income	Not reported	Not reported	Not reported	Not reported
	Building characteristics				
	Pets	93 (46.5)	106 (56.1)	182 (46)	197 (50.6)
	Presence of mould or damp spots	21 (10.6)	44 (23.8)	54 (13.7)	83 (21.2)
	Coal, wood, gas or oil for heating	8 (4.4)	13 (7.9)	10 (2.7)	12 (3.4)
	Double glazing or door and window seals as insulating measures	151 (74.4)	131 (70.4)	372 (93.5)	356 (90.4)
	Gas cooking	4 (2)	7 (3.8)	254 (67.9)	268 (71.1)

Bibliographic reference	**Mommers M, Jongmans-Liedekerken A W, Derkx R et.al (2005) Indoor environment and respiratory symptoms in children living in the Dutch-German borderland. International journal of hygiene and environmental health 208(5), 373-81**		
Inclusion criteria	Inclusion criteria for cases Asthmatic symptoms (reported wheezing and attacks of shortness of breath with wheezing in the past 12 months Coughing (reported coughing in the morning or during the day or evening, in the autumn and winter and coughing daily for about 3 months a year Inclusion criteria for controls No symptoms		
Exclusion criteria	Not reported		
Type of pollutant/exposure	Presence of mould or damp spots Pet dander from pet keeping NO_2 from gas cooking and unvented gas appliances Fuel for heating		
Pollutant/exposure assessment	Assessed using corresponding questions from the International Study of Asthma and Allergies in Childhood (ISAAC) questionnaire: For pet keeping and mould or damp spots categories including duration of exposure were constructed (i.e. never exposed, exposed for a short period, exposed for a long period, and always exposed). Insulation included double glazing or door and window seals in the living room, child's bedroom, bathroom or kitchen. Heating was defined as favourable when central heating or electricity was used and unfavourable when coal, wood, gas or oil was used. Socio-economic status (SES) was defined as low, middle or high according to the highest level of education of the father or mother.		
Health outcome	Asthmatic symptoms and coughing		
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between risk factors and asthmatic symptoms and coughing		
		Asthmatic symptoms	Coughing
		OR (95%CI)	OR (95%CI)
	Gender (male vs. female)	2.25 (1.63, 3.12)	1.30 (0.98, 1.72)
	Pets		
	Short period in the past	1.21 (0.81, 1.82)	1.56 (1.10, 2.20)
	Long period in the past	1.32 (0.83, 2.10)	1.10 (0.72, 1.68)
	Always	2.18 (1.39, 3.42)	1.64 (1.09, 2.46)
	Mould or damp spots		
	Short period	1.97 (1.21, 3.22)	2.03 (1.32, 3.14)
	Long period	2.98 (1.10, 8.28)	3.25 (1.35, 8.28)
	Always	0.76 (0.21, 2.57)	1.24 (0.40, 3.88)
	Gas cooking with cooker hood		
	Used daily	0.94 (0.60, 1.46)	0.93 (0.64,1.36)

Bibliographic reference	**Mommers M, Jongmans-Liedekerken A W, Derkx R et.al (2005) Indoor environment and respiratory symptoms in children living in the Dutch-German borderland. International journal of hygiene and environmental health 208(5), 373-81**		
	Used regularly	1.27 (0.61, 2.64)	1.49 (0.80, 2.78)
	Not used	1.25 (0.69, 2.26)	1.25 (0.74, 2.11)
	Water heating		
	Unvented gas geyser	3.01 (1.21, 7.56)	1.74 (0.74, 4.12)
	Vented gas geyser	1.33 (0.83, 2.14)	1.28 (0.85, 1.94)
	Heating		
	Unfavourable vs. favourable	0.93 (0.34, 2.37)	1.52 (0.72, 3.23)
	Socio-economic status (SES)		
	Middle vs. high	1.43 (1.00, 2.04)	1.53 (1.12, 2.10)
	Low vs. high	3.32 (1.88, 5.93)	3.37 (2.01, 5.71)
Follow up	12 months		
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average child in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • written self-report Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for environmental tobacco smoke • study controls for other factor including gender , smoking during pregnancy, presence of pets, mould or damp spots, wall-to-wall carpeting, presence of insulation measures, hearth or open fire place, gas cooking, water heating, organic waste removal and heating method, SES and country of residence Outcome Assessment of outcome • self-report via questionnaire Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • subjects lost to follow up unlikely to introduce bias - description provided of those lost) **Overall level of bias – High** (concerns over self-report of exposure and outcomes)		

Bibliographic reference	**Mommers M, Jongmans-Liedekerken A W, Derkx R et.al (2005) Indoor environment and respiratory symptoms in children living in the Dutch-German borderland. International journal of hygiene and environmental health 208(5), 373-81**
Source of funding	**Government:** Study was financially supported by European Union, the Euregio Maas-Rhine, the Land Northrhine-West-phalia, the province of Limburg and the counties of Heinsberg, Midden-Limburg and Westelijke Mijnstreek
Comments	Though authors did not measure indoor NO_2 levels directly but used the presence of gas appliances as a proxy.

D.1.81 Morgenstern 2007

Bibliographic reference	**Morgenstern V, Zutavern A, Cyrys J, et al (2007) Respiratory health and individual estimated exposure to traffic-related air pollutants in a cohort of young children. Occupational and environmental medicine 64(1), 8-16**		
Study design	Prospective cohort study		
Objective	To estimate long-term exposure to traffic-related air pollutants on an individual basis and to assess adverse health effects using a combination of air pollution measurement data, data from geographical information systems (GIS) and questionnaire data		
Setting/Study location	Germany		
Number of participants	3577 children		
Selected population	No		
Participant characteristics	Description	No.	%
	Sex (female) sex	1489	52.4
	Age (years); mean (SD)	Not reported	Not reported
	Ethnicity	Not reported	Not reported
	Cases/selected population/comorbidity	Not reported	Not reported
	Socio-economic status (maternal education)		
	<12 grades	925	29.7
	≥12 grades	1853	59.5
	Building characteristics		
	Home dampness	218	7.1
	Indoor moulds	934	30.3
Inclusion criteria	Not reported		
Exclusion criteria	Not reported		
Type of pollutant/exposure	Particulate matter (PM), NO_2 and proximity to the main road		

Bibliographic reference	Morgenstern V, Zutavern A, Cyrys J, et al (2007) Respiratory health and individual estimated exposure to traffic-related air pollutants in a cohort of young children. Occupational and environmental medicine 64(1), 8-16	
Pollutant/exposure assessment	All particulate matter and NO_2 measurements were made during 2-week intervals. The air was sampled for 15 min every 2 h for a total of approximately 42 hours per sampling period. The collection time was recorded by an electronic timer. For traffic data, circular buffers with radii of 50, 100, 250, 500, 1000, 2500 and 5000 m were created around the coordinates of interest and intersected with the road network. As it was not feasible to measure personal exposure to the traffic-related air pollutants NO_2, $PM_{2.5}$ and $PM_{2.5}$ absorbance for all study subjects, exposure modelling was used.	
Outcome	Asthma, allergic symptoms and respiratory infections	
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between distance to major road, PM, NO_2, asthma, allergic symptoms and respiratory infections. aORs of symptoms associated with interquartile range of air pollution variables	
	Distance to main road<50m	
	Wheeze	1.14 (0.92, 1.42)
	Cough without infection	0.74 (0.55, 1.00)
	Dry cough at night	0.84 (0.61, 1.16)
	Asthmatic/spastic/ obstructive bronchitis	1.12 (0.88, 1.44)
	Respiratory infections	1.03 (0.86, 1.23)
	Sneezing, runny/stuffed nose	1.10 (0.87, 1.39)
Follow up	2 years	
Study methods	All data on health outcomes and potential confounding variables were obtained through questionnaires that were completed by the parents. The association between exposure and health outcomes was tested by multiple logistic regression, with adjustment for potential confounding factors. In addition, authors looked at the association between living close to major roads and the health effects. The cut-off for the variable ‘‘living close to major road’’ was based on the hypothesis that the largest contribution from large streets to air pollution is expected at short distances.	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average child in the community Selection of the non-exposed cohort • no description of the derivation of the non-exposed cohort Ascertainment of exposure • validated measurement used Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for sex, parental atopy, maternal education, siblings, environmental tobacco smoke at home, use of gas for cooking, home dampness, indoor moulds and keeping pets	

Bibliographic reference	**Morgenstern V, Zutavern A, Cyrys J, et al (2007) Respiratory health and individual estimated exposure to traffic-related air pollutants in a cohort of young children. Occupational and environmental medicine 64(1), 8-16**
	Outcome Assessment of outcome • questionnaires/self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • subjects lost to follow up unlikely to introduce bias **overall risk of bias: Moderate** (concerns over self-report of outcomes) moderate risk: potential for response bias for outcome assessment
Source of funding	Not reported
Comments	

D.1.82 Morgenstern 2008

Bibliographic reference	**Morgenstern V, Zutavern A, Cyrys J, et al (2008) Atopic diseases, allergic sensitization, and exposure to traffic-related air pollution in children. American journal of respiratory and critical care medicine 177(12), 1331-7**		
Study design	Prospective cohort study		
Objective	To assess the relationship between individual-based exposure to traffic-related air pollutants and allergic disease outcomes in a prospective birth cohort study during the first 6 years of life		
Setting/Study location	Germany		
Number of participants	5921 children		
Selected population	No		
Participant characteristics	Description	No.	%
	Sex (female) sex	1,486	51.6
	Age (years); mean (SD)	Not reported	Not reported
	Ethnicity	Not reported	Not reported
	Cases/selected population	Not reported	Not reported
	Socio-economic status (maternal education)		
	<12 grades	1,909	70.1
	≥12 grades	1,074	39.4
	Building characteristics		
	Home dampness	89	3.1
	Indoor moulds	415	15.1
Inclusion criteria	Not reported		
Exclusion criteria	Not reported		

<table>
<tr><th>Bibliographic reference</th><th colspan="2">Morgenstern V, Zutavern A, Cyrys J, et al (2008) Atopic diseases, allergic sensitization, and exposure to traffic-related air pollution in children. American journal of respiratory and critical care medicine 177(12), 1331-7</th></tr>
<tr><td>Type of pollutant/exposure</td><td colspan="2">Particulate matter (PM), NO_2 and proximity to the main road</td></tr>
<tr><td>Pollutant/exposure assessment</td><td colspan="2">All particulate matter and NO_2 measurements were made during 2-week intervals. The air was sampled for 15 min every 2 h for a total of approximately 42 hours per sampling period. The collection time was recorded by an electronic timer.
For traffic data, circular buffers with radii of 50, 100, 250, 500, 1000, 2500 and 5000 m were created around the coordinates of interest and intersected with the road network.
As it was not feasible to measure personal exposure to the traffic-related air pollutants NO_2, $PM_{2.5}$ and $PM_{2.5}$ absorbance for all study subjects, exposure modelling was used.</td></tr>
<tr><td>Outcome</td><td colspan="2">Asthma, Hay fever, eczema</td></tr>
<tr><td rowspan="5">Results</td><td colspan="2">Adjusted odds ratios (aORs) and 95% confidence intervals (CIs)</td></tr>
<tr><td>Distance to main road<50m</td><td>aOR (95%CI)</td></tr>
<tr><td>Asthma</td><td>1.66 (1.01, 2.59)</td></tr>
<tr><td>Hay Fever</td><td>1.16 (0.67, 2.00)</td></tr>
<tr><td>Eczema</td><td>0.96 (0.72, 1.11)</td></tr>
<tr><td>Follow up</td><td colspan="2">6 years</td></tr>
<tr><td>Study methods</td><td colspan="2">All data on health outcomes and potential confounding variables were obtained through questionnaires that were completed by the parents.
Parents were asked the following: ‘‘Has a physician diagnosed any of the following diseases during the past year of life: . . . asthmatic/spastic/ obstructive bronchitis, asthma, hay fever, allergic/eczema?’’ If the parents selected yes, the child was defined to have ‘‘physician-diagnosed disease,’’ which was the primary outcome parameter.
The association between exposure and health outcomes was tested by multiple logistic regression, with adjustment for potential confounding factors. In addition, authors looked at the association between living close to major roads and the health effects. The cut-off for the variable ‘‘living close to major road’’ was based on the hypothesis that the largest contribution from large streets to air pollution is expected at short distances.</td></tr>
<tr><td>Risk of bias (Newcastle-Ottawa Scale)</td><td colspan="2">Selection
Representativeness of the exposed cohort
• truly representative of the average child in the community
Selection of the non-exposed cohort
• no description of the derivation of the non-exposed cohort
Ascertainment of exposure
• validated measurement used
Demonstration that outcome of interest was not present at start of study
• Yes
Comparability
Comparability of cohorts on the basis of the design or analysis
• study controls for sex, parental atopy, maternal education, siblings, environmental tobacco smoke at home, use of gas for cooking, home dampness, indoor moulds and keeping pets</td></tr>
</table>

Bibliographic reference	**Morgenstern V, Zutavern A, Cyrys J, et al (2008) Atopic diseases, allergic sensitization, and exposure to traffic-related air pollution in children. American journal of respiratory and critical care medicine 177(12), 1331-7**
	Outcome Assessment of outcome • questionnaires/self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • subjects lost to follow up unlikely to introduce bias **overall risk of bias: Moderate** (potential for recall bias for outcome assessment)
Source of funding	**Government:** BMU (for the Institut fu¨r Umweltmedizinische Forschung; FKZ 20462296) and the Federal Ministry for Education, Science, Research, and Technology (no. 01EG9705/2 and 01EG9732). The determination of specific IgE antibodies was financially supported by the Child Health Foundation (Stiftung Kindergesundheit).
Comments	

D.1.831 Nenna 2017

Bibliographic reference	**Nenna R, Cutrera R, Frassanito A (2017) Modifiable risk factors associated with bronchiolitis. Therapeutic Advances in Respiratory Disease 11(10), 393-401**		
Study design	Case control study		
Objective	To examine whether exposure to various indoor and outdoor pollutants was associated with acute bronchiolitis		
Setting/Study location	Italy		
Number of participants	416 infants		
Selected population	Yes (selected on case hospitalised for bronchiolitis)		
Participant characteristics	Building characteristics: Location: Urban Dwelling type: Apartment Building age: Before 1990 Type of ownership/tenancy: Individual characteristics: Age (Median & range): Gender: Male (%) Smoker in home: Race	Cases Not reported 75.0% 63.9% Not reported 2 months; (0.5–12) 118 (55.4%) Not reported Not reported 213 (100%)	Controls Not reported 71.7% 53.0% Not reported 12 months (0.5–36) 116 (54.5%) Not reported Not reported O (0%)
Inclusion criteria	Inclusion criteria for cases were a diagnosis of bronchiolitis, without neonatal respiratory disorders or other chronic diseases. Inclusion criteria for controls were no respiratory diseases, and a medical history negative for lower respiratory tract diseases and neonatal respiratory disorders.		
Exclusion criteria	None reported		
Type of pollutant/exposure	Use of seed oil for cooking Number of cohabitants		

Bibliographic reference	Nenna R, Cutrera R, Frassanito A (2017) Modifiable risk factors associated with bronchiolitis. Therapeutic Advances in Respiratory Disease 11(10), 393-401	
Pollutant/exposure assessment	Self-reported questionnaire	
Outcome	Bronchiolitis - defined as the first episode of acute lower respiratory tract infection characterized by the presence of auscultator crackles, in infants aged ⩽12 months	
Results	Use of seed oil for cooking Number of cohabitants ≥ 4	aOR (95%CI) 1.82 (1.206; 2.741) 1.748 (1.364; 2.132]
Follow up	Unclear	
Newcastle-Ottawa Scale	Selection Is the case definition adequate? • yes, with independent validation □ Representativeness of the cases • consecutive or obviously representative series of cases □ Selection of Controls • hospital controls Definition of Controls • no history of disease (endpoint) Comparability Comparability of cases and controls on the basis of the design or analysis • study controls for age • study does not cover other confounding variables Exposure Ascertainment of exposure • written self-report only Same method of ascertainment for cases and controls • yes Non-Response rate • same rate for both groups **Overall assessment=High** (concerns over self-report of exposure and outcomes)	
Source of funding	No funding reported (This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors).	
Comments	Not all pollutants measured reported	

D.1.84 Norback 2013

Bibliographic reference	Norback D, Zock J P, Plana E, et al (2013) Mould and dampness in dwelling places, and onset of asthma: The population-based cohort ECRHS. Occupational and Environmental Medicine 70(5), 325-331
Study design	Prospective cohort study
Objective	To investigate new onset of asthma in the ECRHS II in relation to self-reported as well as o2013 (observed building dampness and indoor moulds in the dwelling,

Bibliographic reference	**Norback D, Zock J P, Plana E, et al (2013) Mould and dampness in dwelling places, and onset of asthma: The population-based cohort ECRHS. Occupational and Environmental Medicine 70(5), 325-331**		
Setting/Study location	11 countries in Europe and two outside Europe (Melbourne in Australia and Portland in USA)		
Number of participants	7104 adults		
Selected population	No		
Participant characteristics	Description		
	Sex	Not reported	
	Age (years)-	Not reported	
	Ethnicity	Not reported	
	Education	Not reported	
	Annual family income	Not reported	
Inclusion criteria	Not reported		
Exclusion criteria	Not report		
Type of pollutant/exposure	Dampness and mould		
Pollutant/exposure assessment	Questionnaire		
Outcome	Asthma Bronchial hyper-responsiveness		
Results	Adjusted risk ratios (aRRs) and 95% confidence intervals (CIs) for association between dampness, moulds, asthma and bronchial hyper-responsiveness (BHR)		
		Asthma	Asthma and BHR
		aRR (95%CI)	aRR (95%CI)
	Any visible mould	1.15 (0.71, 1.85)	1.74 (0.68, 4.45)
	Any damp spots	1.49 (1.00, 2.22)	1.88 (0.84, 4.22)
	Reported window condensation in winter in any room	1.07 (0.75, 1.53)	1.43 (0.67, 3.07)
Follow up	Between 5.9 and 11.7 years		
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average person in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • written self-report Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for smoking status • study controls for additional factor as follows - age, sex, and centre Outcome		

Bibliographic reference	**Norback D, Zock J P, Plana E, et al (2013) Mould and dampness in dwelling places, and onset of asthma: The population-based cohort ECRHS. Occupational and Environmental Medicine 70(5), 325-331**
	Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall level of bias – High** (concerns over self-report of exposure and outcomes)
Source of funding	**Government:** European Commission
Comments	

D.1.85 O'Connor 2017

Bibliographic reference	**O'Connor GT, Lynch SV, Bloomberg GR, et al (2017) Early-life home environment and risk of asthma among inner-city children. Journal of Allergy and Clinical Immunology , 141(6) 1468 - 75**	
Study design	Prospective cohort study	
Objective	To examine exposures in the prenatal period and first 3 years of life, including allergens and microbes in house dust, as potential risk factors for asthma at age 7 years	
Setting/Study location	United States	
Number of participants	442 children	
Selected population	Yes – at risk of asthma	
Participant characteristics	Age	Not reported
	Sex Male	 226 (51%)
	Race / ethnicity Black Hispanic Mixed / Other	 318 (72%) 87 (20%) 37 (8%)
	SES Reported as maternal education Less than high school High school More than high school	 183 (42%) 151 (34%) 107 (24%)
Inclusion criteria	Pregnant women aged 18 years or older a history of asthma, allergic rhinitis, or eczema, in the mother or father	
Exclusion criteria	Not reported	
Type of pollutant / exposure	House dust NO_2	

Bibliographic reference	**O'Connor GT, Lynch SV, Bloomberg GR, et al (2017) Early-life home environment and risk of asthma among inner-city children. Journal of Allergy and Clinical Immunology , 141(6) 1468 - 75**	
Pollutant / exposure assessment	Home visits to collect environmental data and specimens began after birth, with visits 3 months after birth and in the second and third years of life that included house dust collection Indoor nitrogen dioxide concentration was measured during the same 14 days with a modified diffusion filter sampler	
Outcome	Adjusted odds ratio and 95% confidence intervals	
Results	Exposure at 3 months	Asthma at 7 years
	Allergens (mg/g)	
	House dust (Der f 1) per interquartile increase in exposure.	0.98 (0.91, 1.04)
	Cat (Fel d 1) per interquartile increase in exposure.	0.78 (0.62, 0.98)
	Dog (Can f 1) increase from the 25th to the 85th percentile.	0.62 (0.37, 1.03)
	Exposure at 1 year	
	Nitrogen dioxide (per interquartile increase in exposure.	0.97 (0.75, 1.26)
Follow up	7 years	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average child in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • objective sampling Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for maternal asthma • study controls for additional factors – sex and race Outcome Assessment of outcome • independent assessment Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias: Low**	
Source of funding	**Government:** National Institute of Allergy and Infectious Diseases/National Institutes of Health (NIH), National Center for Research Resources/NIH, National Center for the Advancement of Translational Research/NIH	
Comments		

D.1.86 Ostro 1993

Bibliographic reference	**Ostro B D, Lipsett M J, Mann J K, et al (1993) Air pollution and respiratory morbidity among adults in southern California. American journal of epidemiology 137(7), 691-700**		
Study design	Prospective cohort study		
Objective	To examine exposure to poor air quality and respiratory illness		
Setting/Study location	United States		
Number of participants	321 adults		
Selected population	No		
Participant characteristics	Age		Not reported
	Sex Male		 48%
	Race / ethnicity White		 89%
	SES reported as educational level High school graduate 2-year college degree 4-year college degree Postgraduate degree		 42.4 10.6 17.1 9.0
Inclusion criteria	Families who had at least one child in elementary school and resided in Glendora, Covina, or Azusa		
Exclusion criteria	Not reported		
Type of pollutant / exposure	Gas stove		
Pollutant / exposure assessment	Self-report		
Outcome	Adjust odds ratio and 95% confidence intervals for Respiratory illness (upper or lower)		
Results	 Gas stove	Lower RTI aOR (95%CI) 1.23 (1.03, 1.47)	Upper RTI aOR (95%CI) 1.06 (0.94, 1.18)
Follow up	6 months		
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort i) truly representative of the average adult in the community Selection of the non-exposed cohort j) drawn from the same community as the exposed cohort Ascertainment of exposure k) written self-report		

Bibliographic reference	**Ostro B D, Lipsett M J, Mann J K, et al (1993) Air pollution and respiratory morbidity among adults in southern California. American journal of epidemiology 137(7), 691-700**
	Demonstration that outcome of interest was not present at start of study l) Yes Comparability Comparability of cohorts on the basis of the design or analysis m) study controls for presence of chronic respiratory disease. n) study controls for additional factor - sex Outcome Assessment of outcome o) self-report – daily diary Was follow-up long enough for outcomes to occur p) Yes Adequacy of follow up of cohorts q) complete follow up - all subjects accounted for **Overall risk of bias: Low**
Source of funding	Not reported
Comments	

D.1.87 Pettigrew 2004

Bibliographic reference	**Pettigrew M M, Gent J F, Triche E W, Belanger K O, Bracken M B, and Leaderer B P (2004) Association of early-onset otitis media in infants and exposure to household mould. Paediatric and Perinatal Epidemiology 18(6), 441-447**	
Study design	Prospective cohort study	
Objective	To examine the relationship between levels of household mould and otitis media among a cohort of infants at high risk for asthma.	
Setting/Study location	United States	
Number of participants	1002	
Selected population	Yes – at high risk of asthma	
Participant characteristics	Description	
	Sex	
	○ Male	398
	○ Female	408
	Age (years)- Mean (SD) Maternal	Not reported
	Ethnicity	
	○ White	533
	○ Black	103
	○ Hispanic	170
	Education	
	○ <High school diploma	98
	○ High school diploma . some college	419

Bibliographic reference	**Pettigrew M M, Gent J F, Triche E W, Belanger K O, Bracken M B, and Leaderer B P (2004) Association of early-onset otitis media in infants and exposure to household mould. Paediatric and Perinatal Epidemiology 18(6), 441-447**	
	○ College / Higher	289
Inclusion criteria	Women with at least one other child with physician-diagnosed asthma	
Exclusion criteria	Not reported	
Type of pollutant/exposure	Mould	
Pollutant/exposure assessment	Objective sampling - airborne mould samples were collected from the main living area of the home Fungi were identified to the genus level and recorded in colony forming units (CFU) per cubic metre	
Outcome	First episode of otitis media <6 months of age	
Results		aOR ((95%CI)
	Mould	1.37 (0.94, 2.02)
	Penicillium Undetectable 0 CFU/m^3 Low 1–499 CFU/m^3 Medium 500–999 CFU/m^3 High ≥1000 CFU/m^3	Reference 0.75 [0.52, 1.08] 1.89 [0.67, 5.30] 1.27 [0.56, 2.86]
	Cladosporium Undetectable 0 CFU/m^3 Low 1–499 CFU/m^3 Medium 500–999 CFU/m^3 High ≥1000 CFU/m^3	Reference 1.04 [0.70, 1.56] 0.92 [0.48, 1.79] 1.09 [0.52, 2.29]
	'Other' mould Undetectable 0 CFU/m^3 Low 1–499 CFU/m^3 Medium 500–999 CFU/m^3 High ≥1000 CFU/m^3	Reference 1.21 [0.84, 1.74] 0.72 [0.29, 1.80] 3.45 [1.36, 8.76]
Follow up	6 months	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • selected group of at risk children Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • Objective sampling Demonstration that outcome of interest was not present at start of study • Yes Comparability	

Bibliographic reference	**Pettigrew M M, Gent J F, Triche E W, Belanger K O, Bracken M B, and Leaderer B P (2004) Association of early-onset otitis media in infants and exposure to household mould. Paediatric and Perinatal Epidemiology 18(6), 441-447**
	Comparability of cohorts on the basis of the design or analysis • study controls for smoke exposure • study controls for additional factors as follows , ethnicity.) Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall level of bias – Moderate** (concerns over self-report of outcomes)
Source of funding	Government: National Institute of Environmental Health Sciences.
Comments	

D.1.88 Pettigrew 2004 b

Bibliographic reference	**Pettigrew MM, Gent JF, Triche EW, et al (2004) Infant otitis media and the use of secondary heating sources. Epidemiology (Cambridge, and Mass.) 15(1), 13-20**	
Study design	Prospective cohort study	
Objective	To assess the effect of environmental exposures from secondary home heating sources on otitis media and recurrent otitis media on infants in the first year of life.	
Setting/Study location	United States	
Number of participants	813 infants	
Selected population	No	
Participant characteristics	Description	No. (%)
	Sex Male female	 (52%) (48%)
	Maternal age (years)	Not reported
	Ethnicity	Not reported
	Maternal asthma and/or atopic	80 (9%)
	SES	Not reported
	Annual family income	Not reported
	Building characteristics	Not reported
Inclusion criteria	Mothers who were delivering babies at 7 hospitals in Connecticut and 5 hospitals in Virginia between 1993 and 1996.	

Bibliographic reference	**Pettigrew MM, Gent JF, Triche EW, et al (2004) Infant otitis media and the use of secondary heating sources. Epidemiology (Cambridge, and Mass.) 15(1), 13-20**	
Exclusion criteria	Smoking in the household	
Type of pollutant/exposure	Secondary heating sources Air conditioning Pets Mould	
Pollutant/exposure assessment	Interviews	
Outcome	Clinical diagnosis of otitis media Recurrent otitis media defined as 4 or more episodes of otitis media (separated by at least 21 days) in one year.	
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs)	
	Any exposure	Recurrent otitis media
	Fireplace Wood stove Kerosene heater Air conditioning Reported mould Cat or dog	0.99 (0.58, 1.72) 1.22 (0.66, 2.23) 0.94 (0.50, 1.78) 0.52 (0.27, 1.03) 1.15 (0.67, 1.99) 0.76 (0.47, 1.26)
	Any daily use	Episode of otitis media
	Fireplace Wood stove Kerosene heater Air conditioning Reported mould Cat or dog	1.14 (0.90, 1.45) 1.08 (0.85, 1.38) 0.91 (0.67, 1.25) 0.93 (0.77, 1.11) 1.05 (0.88, 1.26) 1.06 (0.90, 1.25)
Follow up	12 months	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort r) truly representative of the average infant Selection of the non-exposed cohort s) drawn from the same community as the exposed cohort Ascertainment of exposure t) written self-report Demonstration that outcome of interest was not present at start of study u) Yes Comparability Comparability of cohorts on the basis of the design or analysis v) study controls for gas stove use w) study controls for additional factors as follows - number of children in household, multifamily dwelling, history of allergies, education, race, state of residence Outcome	

Bibliographic reference	Pettigrew MM, Gent JF, Triche EW, et al (2004) Infant otitis media and the use of secondary heating sources. Epidemiology (Cambridge, and Mass.) 15(1), 13-20
	Assessment of outcome x) self-report (maternal) Was follow-up long enough for outcomes to occur y) Yes Adequacy of follow up of cohorts z) complete follow up - all subjects accounted for **Overall level of bias – Low**
Source of funding	Government: National Institute of Environmental Health Sciences
Comments	

D.1.89 Pindus 2016

Bibliographic reference	Pindus M, Orru H, Maasikmets M, et al (2016) Association between health symptoms and particulate matter from traffic and residential heating - Results from RHINE III in Tartu. Open Respiratory Medicine Journal 10, 58-69	
Study design	Prospective cohort study	
Objective	To investigate potential effects of traffic and residential heating induced particles on respiratory and cardiac health.	
Setting/Study location	Estonia	
Number of participants	905	
Selected population	No	
Participant characteristics	Description	
	Gender	
	Male	362 (40.0%)
	Female	543 (60.0%)
	Age years (mean)	50
	Ethnicity	Not reported
	Education	
	Basic	46 (5.2%)
	Secondary	454 (51.4%)
	Higher	383 (43.4%)
	SES	Not reported
	Building characteristics	Not reported
Inclusion criteria	Not reported	
Exclusion criteria	Not reported	

Bibliographic reference	**Pindus M, Orru H, Maasikmets M, et al (2016) Association between health symptoms and particulate matter from traffic and residential heating - Results from RHINE III in Tartu. Open Respiratory Medicine Journal 10, 58-69**	
Type of pollutant/exposure	Particulate matter (PM) from traffic and residential heating	
Pollutant/exposure assessment	Concentrations of $PM_{2.5}$ and PM_{10} for the years 2009-2012 were calculated for grid size of 100x100 m across Tartu using a Eulerian air quality dispersion model part of the AirViro Air Quality Management System. Household $PM_{2.5}$ emissions (g/s) were calculated according to the size (m2) of each's homes heated area	
Outcome		
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between PM, respiratory and cardiac conditions	
		Residential heating induced $PM_{2.5}$
		aOR (95%CI)
	Cough	0.95 (0.72, 1.29)
	Wheeze without cold	1.14 (0.75, 1.73)
	Asthma	1.16 (0.60, 2.19)
	Allergic rhinitis	0.63 (0.42, 0.94)
	Breathlessness	0.97 (0.64, 1.48)
	Chest tightness	1.05 (0.72, 1.51)
	Cardiac disease	0.92 (0.60, 1.39)
	Hypertension	0.78 (0.54, 1.12)
	Stroke	0.85 (0.27, 2.71)
	Heart infarction or angina pectoris	0.67 (0.28, 1.56)
Follow up	12 months	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average person in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • Modelled exposure Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for ETS (environmental tobacco smoke) at home • study controls for any additional factors - gender, age, body mass index (BMI), education level, and smoking history Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur	

Bibliographic reference	**Pindus M, Orru H, Maasikmets M, et al (2016) Association between health symptoms and particulate matter from traffic and residential heating - Results from RHINE III in Tartu. Open Respiratory Medicine Journal 10, 58-69**
	• Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for ☐ **Overall risk of bias: Moderate** (concerns over self-report of outcomes)
Source of funding	**Government:** The Estonian Ministry of Education and Research **Charity:** The Estonian Science Foundation.
Comments	

D.1.90 Ponsonby 2001

Bibliographic reference	**Ponsonby A L, Dwyer T, Kemp A et.al (2001). A prospective study of the association between home gas appliance use during infancy and subsequent dust mite sensitization and lung function in childhood. Clinical and experimental allergy: journal of the British Society for Allergy and Clinical Immunology, 31(10), pp.1544-52.**		
Study design	Prospective cohort study		
Objective	To examine the relationship between domestic gas appliance, use during infancy and childhood and the development of house dust mite (HDM) sensitization and asthma		
Setting/Study location	Australia		
Number of participants	456 children		
Selected population	No		
Participant characteristics	Description	No.	%
	Sex	Not reported	Not reported
	Maternal age (years)	Not reported	Not reported
	Ethnicity	Not reported	Not reported
	(Maintenance) medication use	Not reported	Not reported
	Maternal asthma and/or atopic	Not reported	Not reported
	Parental education	Not reported	Not reported
	Annual family income	Not reported	Not reported
	Building characteristics	Not reported	Not reported
Inclusion criteria	Multiple births		
Exclusion criteria	Not reported		
Type of pollutant/exposure	NO_2 from home gas appliance House dust mite (HDM)		

Bibliographic reference	**Ponsonby A L, Dwyer T, Kemp A et.al (2001). A prospective study of the association between home gas appliance use during infancy and subsequent dust mite sensitization and lung function in childhood. Clinical and experimental allergy: journal of the British Society for Allergy and Clinical Immunology, 31(10), pp.1544-52.**
Pollutant/exposure assessment	Home gas appliance use defined as the positive report of gas cooking or gas heater use in the living room. Skin prick testing (SPT) was used to assess the cutaneous reaction to exposure to house dust mites. Weal allergen reactions of 3 mm or greater at 15 minutes were classified as positive
Outcome	HDM sensitisation Asthma
Results	Adjusted relative risk (aRR) and 95% confidence intervals (CIs) for association between home gas cooking, home gas appliance use, asthma and HDM sensitisation during infancy

	Asthma
	RR (95%CI)
Home gas cooking	Not reported
Gas heaters	Not reported
Home gas appliance use	1.30 (0.74, 2.29)

Adjusted relative risk (aRR) and 95% confidence intervals (CIs) for association between asthma and HDM sensitisation during infancy

	Asthma
	RR (95%CI)
HDM sensitisation	1.65 (1.32, 2.06)

Follow up	8 years
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average child in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • written self-report Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for family history of asthma at birth • study controls for other factors as follows - Private health insurance, plastic mattress liner used, sheepskin use, early food introduction, more than six residents in household, carpet use in infant bedroom, mother smoked during pregnancy and infant exclusively breast fed Outcome Assessment of outcome • record linkage Was follow-up long enough for outcomes to occur • Yes

Bibliographic reference	**Ponsonby A L, Dwyer T, Kemp A et.al (2001). A prospective study of the association between home gas appliance use during infancy and subsequent dust mite sensitization and lung function in childhood. Clinical and experimental allergy: journal of the British Society for Allergy and Clinical Immunology, 31(10), pp.1544-52.**
	Adequacy of follow up of cohorts • complete follow up - all subjects accounted for ☐ **Overall level of bias – Moderate** (concerns over self-report of exposure)
Source of funding	**Charity:** Asthma Foundation of Tasmania for equipment loan. **Government:** The Tasmanian Infant Health Survey was supported by the US National Institutes of Health Grant, the Tasmanian State Government , the Australian Rotatory Health Research Fund, the National Health and Medical Research Council of Australia, the National Sudden Infant Death Syndrome Council of Australia, Health, Zonta International **Industry:** The Tasmanian Infant Health Survey was supported by Wyeth Pharmaceuticals
Comments	Authors suggest that that indoor gas appliance use was associated with an increased risk of allergic sensitisation in children. Study survey reported the use of bottled gas for heaters of portable or fixed type. Thus, results pertain to gas combustion heaters rather than modern ducted gas central heating

D.1.91 Power 2015

Bibliographic reference	**Power MC, Kioumourtzoglou M-A, Hart JaE, et al (2015) The relation between past exposure to fine particulate air pollution and prevalent anxiety: observational cohort study. BMJ (Clinical research ed.) 350, h1111**		
Study design	Prospective cohort study		
Objective	To determine whether higher past exposure to particulate air pollution is associated with prevalent high symptoms of anxiety.		
Setting/Study location	United States		
Number of participants	71 271 women		
Participant characteristics	Description	No.	%
	Sex (female) sex	All female	All female
	Age (years); mean (SD)	Not reported	Not reported
	Ethnicity	Not reported	Not reported
	Cases/selected population	Not reported	Not reported
	Socio-economic status (education)		
	Registered nurse	44 907	63.0
	Bachelor's degree	13 368	18.8
	Master's degree or PhD	6607	9.3
	Missing	6389	9.0

Bibliographic reference	**Power MC, Kioumourtzoglou M-A, Hart JaE, et al (2015) The relation between past exposure to fine particulate air pollution and prevalent anxiety: observational cohort study. BMJ (Clinical research ed.) 350, h1111**		
	Building characteristics	Not reported	Not reported
Inclusion criteria	Not reported		
Exclusion criteria	Not reported		
Type of pollutant/exposure	Proximity to traffic and particulate matter (PM)		
Pollutant/exposure assessment	Using geographic information software (ArcGIS, Version 10.2; Esri, CA), authors computed distance from the residential address of each participant up to 500 m, with a street level geocoding match to the nearest US census feature class code A1 (limited access to primary roads with defined exits and divided directions of travel, that is, interstate highways), A2 (primary major, non-interstate highways and major roads without access restrictions), or A3 (smaller, secondary roads, typically with more than two lanes) road segment. Authors used spatiotemporal prediction models yielding monthly estimates of exposure to particulate matter <10 μm (PM) and <2.5 μm (PM or fine particulate matter) in aerodynamic diameter at the residential address with at least a zip code level geocoding match for each participant to derive multiple exposure metrics for each participant.		
Outcome	High symptoms of anxiety		
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between PM and high symptoms of anxiety		
		High symptoms of anxiety	
		aOR (95%CI)	
	≤ 5Om from motorway	1.01,(0.95, 1.08)	
Follow up	Not reported		
Study methods	The Crown-Crisp index phobic anxiety scale, one of six scales from the Crown-Crisp experiential index, is a measure of anxiety symptom levels and was included in the questionnaire. This scale has been shown to differentiate between people with general anxiety or phobias from those with other psychiatric conditions and healthy comparison participants and has been used in population based research. Authors used logistic regression models to estimate the association between each exposure and high anxiety symptoms (Crown-Crisp index phobic anxiety scale score ≥6) and adjusted for possible confounders		
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average female population in the community Selection of the non-exposed cohort • no description of the derivation of the non-exposed cohort Ascertainment of exposure • validated measurements used Demonstration that outcome of interest was not present at start of study • Yes Comparability		

Bibliographic reference	**Power MC, Kioumourtzoglou M-A, Hart JaE, et al (2015) The relation between past exposure to fine particulate air pollution and prevalent anxiety: observational cohort study. BMJ (Clinical research ed.) 350, h1111**
	Comparability of cohorts on the basis of the design or analysis • study controls for socioeconomic status, education, husband's education, age, employment status, physical activity Outcome Assessment of outcome • validated anxiety scale used Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • subjects lost to follow up unlikely to introduce bias **Overall risk of bias: low**
Source of funding	**Government:** National Institute of Environmental Health Sciences, National Institute of Aging
Comments	

D.1.92 Puett 2014

Bibliographic reference	**Puett RC, Hart JE, Yanosky JD, et al (2014) Particulate matter air pollution exposure, distance to road, and incident lung cancer in the nurses' health study cohort. Environmental health perspectives 122(9), 926-32**		
Study design	Prospective cohort study		
Objective	To examine the relation of lung cancer incidence with long-term residential exposures to ambient particulate matter and residential distance to roadway, as a proxy for traffic related exposures		
Setting/Study location	United States		
Number of participants	103,650 women		
Selected population	No		
Participant characteristics	Description	No.	%
	Sex (female) sex	All female	All female
	Age (years); mean (SD)	67.0 (8.3)	-
	Ethnicity	Not reported	Not reported
	Cases/selected population	Not reported	Not reported
	Socio-economic status (education)	Not reported	Not reported
	Building characteristics	Not reported	Not reported
Inclusion criteria	Not reported		
Exclusion criteria	Previous diagnosis of cancer (except for non-melanoma skin cancer) before follow-up Did not have information for the exposures of interest		

Bibliographic reference	**Puett RC, Hart JE, Yanosky JD, et al (2014) Particulate matter air pollution exposure, distance to road, and incident lung cancer in the nurses' health study cohort. Environmental health perspectives 122(9), 926-32**	
Type of pollutant/exposure	Proximity to major road	
Pollutant/exposure assessment	Authors calculated distance to road at each address as a proxy for traffic related exposures. Distance to the nearest road (meters) was determined using geographic information system (GIS) software (ArcGIS, version 9.3; ESRI, Redlands, CA) and the ESRI Street map Pro2007 data set. Authors calculated the shortest distances to the following road classes as defined by the U.S. Census Bureau (2001): A1 (primary roads, typically interstate highways, with limited access, division between the opposing directions of traffic, and defined exits), A2 (primary major, non-interstate highways and major roads without access restrictions), and A3 (smaller, secondary roads, usually with more than two lanes). Prediction models were used to determine PM surfaces for each month and each PM size fraction	
Outcome	Lung cancer incidence	
Results	Adjusted hazard ratios (aHRs) and 95% confidence intervals (CIs) for association between proximity to major road, PM and Lung cancer incidence	
		Lung cancer incidence
		aHR (95%CI)
	Residential proximity to a major road (metres)	
	≥200	Reference
	50 – 199	0.73 (0.51, 1.04)
	0 – 49	2.01 (1.06, 3.80)
Follow up		
Study methods	Lung cancers were self-reported by the participants or next of kin or were identified from death certificates; and first reports were subsequently confirmed with medical records by physicians blinded to exposure status. However, because lung cancers were well reported in this cohort, we included any primary report reconfirmed by the participant where pathological reports were not available. Time-varying Cox proportional hazards models were used to assess the relationship of incident lung cancer with residential distance to road and exposure to $PM_{2.5}$, PM_{10}, or $PM_{2.5}$ –10 adjusting for possible confounders	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average female population in the community Selection of the non-exposed cohort • no description of the derivation of the non-exposed cohort Ascertainment of exposure • validated measurements used Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for age, time period, geographic region, BMI, alcohol consumption, physical activity, overall diet quality, smoking status Outcome	

Bibliographic reference	**Puett RC, Hart JE, Yanosky JD, et al (2014) Particulate matter air pollution exposure, distance to road, and incident lung cancer in the nurses' health study cohort. Environmental health perspectives 122(9), 926-32**
	Assessment of outcome • record linkage Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • subjects lost to follow up unlikely to introduce bias **overall risk of bias: low**
Source of funding	**Government:** National Institutes of Health
Comments	

D.1.93 Pujades-Rodriguez 2009

<table>
<tr><th>Bibliographic reference</th><th>Pujades-Rodriguez M, McKeever T, Lewis S et.al (2009) Effect of traffic pollution on respiratory and allergic disease in adults: cross-sectional and longitudinal analyses. BMC pulmonary medicine 9, 42</th></tr>
<tr><td>Study design</td><td>Prospective cohort study</td></tr>
<tr><td>Objective</td><td>To determine effect of traffic pollution on respiratory and allergic disease in adults</td></tr>
<tr><td>Setting/Study location</td><td>United Kingdom</td></tr>
<tr><td>Number of participants</td><td>2644 adults</td></tr>
<tr><td>Selected population</td><td>No</td></tr>
<tr><td>Participant characteristics</td><td>
<table>
<tr><td></td><td colspan="2">Cross-sectional analysis (N=2599)</td><td colspan="2">Longitudinal analysis (N=1329)</td></tr>
<tr><td>Description</td><td>No.</td><td>%</td><td>No.</td><td>%</td></tr>
<tr><td>Sex (female)</td><td>1300</td><td>50.0</td><td>670</td><td>50.4</td></tr>
<tr><td>Age (years); mean (SD)</td><td>Not reported</td><td>Not reported</td><td>Not reported</td><td>Not reported</td></tr>
<tr><td>Ethnicity</td><td>Not reported</td><td>Not reported</td><td>Not reported</td><td>Not reported</td></tr>
<tr><td>Cases/selected population</td><td>Not reported</td><td>Not reported</td><td>Not reported</td><td>Not reported</td></tr>
<tr><td>Socio-economic status (education)</td><td>Not reported</td><td>Not reported</td><td>Not reported</td><td>Not reported</td></tr>
<tr><td>Building characteristics</td><td>Not reported</td><td>Not reported</td><td>Not reported</td><td>Not reported</td></tr>
</table>
</td></tr>
<tr><td>Inclusion criteria</td><td>Not reported</td></tr>
<tr><td>Exclusion criteria</td><td>Not reported</td></tr>
<tr><td>Type of pollutant/exposure</td><td>Proximity to traffic and traffic related NO_2</td></tr>
</table>

Bibliographic reference	**Pujades-Rodriguez M, McKeever T, Lewis S et.al (2009) Effect of traffic pollution on respiratory and allergic disease in adults: cross-sectional and longitudinal analyses. BMC pulmonary medicine 9, 42**				
Pollutant/exposure assessment	Authors calculated the shortest distance (in metres) between each address location and the nearest major road, defined as a motorway (freeway), or 'A' or 'B' class road (principal road as classified by UK Department for Transport), using Geographical Information System (GIS) software (ArcGIS 9.0). To compute our modelled NO_2 variable, we linked each home location grid reference to a high resolution map of modelled traffic-related NO_2 using ArcGIS.				
Outcome	Respiratory and allergic outcomes				
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between residential proximity to a main road and respiratory and allergic outcomes				
		Wheezing in the last year	COPD	Bronchial hyper responsiveness	Allergic sensitisation
		aOR (95%CI)	aOR (95%CI)	aOR (95%CI)	aOR (95%CI)
	≤150 m	0.86 (0.68, 1.08)	0.97 (0.68, 1.37)	0.92 (0.68, 1.24)	0.87 (0.70, 1.07)
	>150 m	1.00	1.00	1.00	1.00
	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between modelled NO_2 level and respiratory and allergic outcomes				
	<33.92	1	1	1	1
	33.92 – 34.23	1.03 (0.76, 1.39)	1.09 (0.68, 1.73)	1.08 (0.73, 1.60)	0.98 (0.74, 1.30)
	34.23 – 34.73	0.86 (0.63, 1.16)	0.95 (0.60, 1.52)	0.95 (0.64, 1.41)	1.02 (0.77, 1.35)
	34.73 – 36.79	0.84 (0.63, 1.14)	0.91 (0.57, 1.45)	1.03 (0.70, 1.54)	0.97 (0.73, 1.28)
	>36.79	0.88 (0.66, 1.19)	1.07 (0.68, 1.68)	0.81 (0.54, 1.21)	0.94 (0.72, 1.24)
Follow up					
Study methods	Respiratory outcomes were self-reported from questionnaires. Allergen skin sensitisation, defined as a response to any of the allergens tested at least 3 mm greater than the saline control response in the presence of a positive histamine control; and high total IgE, defined as a concentration above 100 kU/l. Multiple logistic regression analyses were carried out to assess the effect of distance and modelled NO_2 level on each outcome, adjusting for possible confounders.				
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average population in the community				

Bibliographic reference	Pujades-Rodriguez M, McKeever T, Lewis S et.al (2009) Effect of traffic pollution on respiratory and allergic disease in adults: cross-sectional and longitudinal analyses. BMC pulmonary medicine 9, 42
	Selection of the non-exposed cohort • no description of the derivation of the non-exposed cohort Ascertainment of exposure • validated measurement used Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for age, sex, smoking status and deprivation score Outcome Assessment of outcome • clinical investigation • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • subjects lost to follow up unlikely to introduce bias **Overall risk of bias: Moderate:** response bias from self-reported respiratory outcomes
Source of funding	**Charity:** British Lung Foundation, Asthma UK. **Academic:** The Institute of Clinical Research (University of Nottingham)
Comments	

D.1.94 Raaschou-Nielsen 2010

Bibliographic reference	Raaschou-Nielsen O, Hermansen M N, Loland L, et al (2010) Long-term exposure to indoor air pollution and wheezing symptoms in infants. Indoor Air 20(2), 159-167	
Study design	Prospective cohort study	
Objective	To study whether air pollutants alter underlying bronchial hyperresponsiveness, in addition to its previously demonstrated role as a trigger of symptoms	
Setting/Study location	Denmark	
Number of participants	411	
Selected population	Yes – infants at risk of asthma	
Participant characteristics	Description	
	Sex	Not reported
	Age (months);	18 months
	Ethnicity	Not reported
	Socio-economic status	Not reported
	Building characteristics	Not reported

Bibliographic reference	**Raaschou-Nielsen O, Hermansen M N, Loland L, et al (2010) Long-term exposure to indoor air pollution and wheezing symptoms in infants. Indoor Air 20(2), 159-167**	
Inclusion criteria	Infants born to mothers with asthma	
Exclusion criteria	Not reported	
Type of pollutant/exposure	$PM_{2.5}$ NO_2 Formaldehyde	
Pollutant/exposure assessment	NO_2, and formaldehyde were measured in the children's bedrooms away from windows and doors, preferably at about 1.5 m above the floor. Measurements were performed up to three times during the first 18 months of life, for 10 weeks on each occasion. NO_2, and formaldehyde samplers were given to the parents, with comprehensive instructions on how to start and stop the measurements. $PM_{2.5}$ was measured over 1-week periods at the same location in the children's bedrooms. Trained personnel initiated and concluded each measurement	
Outcome	Wheezing	
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs)	
	$PM_{2.5}$ (µg/m^3) Q1 (<10.6) Q2 (10.6–13.2) Q3 (13.2–16.8) Q4 (16.8–24.1) Q5 (>24.1) NO_2 (µg/m^3) Q1 (<5.2) Q2 (5.2–6.8) Q3 (6.8–8.6) Q4 (8.6–11.7) Q5 (>11.7) Formaldehyde (µg/m^3) Q1 (<12.4) Q2 (12.4–16.3) Q3 (16.3–20.3) Q4 (20.3–25.6) Q5 (>25.6)	aOR (95%CI) Reference 1.32 (0.53, 3.27) 1.74 (0.67, 4.47) 0.67 (0.28, 1.59) 1.02 (0.41, t2.57) Reference 0.66 (0.27, 1.61) 0.80 (0.32, 2.01) 1.15 (0.40, 3.32) 0.43 (0.15, 1.18) Reference 1.11 (0.47, 2.63) 1.21 (0.51, 2.92) 1.40 (0.57, 3.47) 0.67 (0.29, 1.54)
Follow up	18 months	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the population in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort	

Bibliographic reference	Raaschou-Nielsen O, Hermansen M N, Loland L, et al (2010) Long-term exposure to indoor air pollution and wheezing symptoms in infants. Indoor Air 20(2), 159-167
	Ascertainment of exposure • Objective measurement Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • Study controls for sex, area of residence, education of mother and (log-transformed) baseline lung function. Outcome Assessment of outcome • Self-report (parent) Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • subjects lost to follow up unlikely to introduce bias **Overall risk of bias: Moderate** (concern over self-report of outcomes)
Source of funding	**Government:** The Danish Ministry of the Interior and Health Research Centre for Environmental Medicine. **Charity:** the Pharmacy Foundation of 1991; the Lundbeck Foundation; The Augustino Foundation; Ronald McDonald House Charities; the Danish Medical Research Council; The Danish Pediatric Asthma Center; Direktør, cand.pharm. K. Gad Andersen og Hustrus Familiefond; Aage Bangs Fond; Danish Lung Association; Kai Lange og Gunhild Kai Langes Fond; Direktør Ib Henriksens Fond; Gerda og Aage Henschs Fond; Rosalie Petersens Fond; Hans og Nora Buchards Fond; Dagmar Marshalls Fond; Foundation of Queen Louise¢ Children Hospital; the Danish Hospital Foundation for Medical Research, Region of Copenhagen, the Faroe Island, and Greenland; Gangsted Fond; Højmosega˚ rd-Legatet; Fonden til Lægevidenskabens Fremme; A.P. Møller og Hustru Chastine Mc-Kinney Møllers Fond til almene Formaal; **Industry:** AstraZenaca; LEOpharma; Pharmacia-Pfizer and Yamanouchi Pharma.
Comments	

D.1.95 Rice 2015

Bibliographic reference	Rice MB, Ljungman PL, Wilker EH, et al (2015) Long-term exposure to traffic emissions and fine particulate matter and lung function decline in the Framingham heart study. American journal of respiratory and critical care medicine 191(6), 656-64
Study design	Prospective cohort study

Bibliographic reference	**Rice MB, Ljungman PL, Wilker EH, et al (2015) Long-term exposure to traffic emissions and fine particulate matter and lung function decline in the Framingham heart study. American journal of respiratory and critical care medicine 191(6), 656-64**		
Objective	To determine if exposure to traffic and $PM_{2.5}$ is associated with longitudinal changes in lung function in a population-based cohort		
Setting/Study location	United States		
Number of participants	6,339		
Participant characteristics	Description	No.	%
	Sex (male) sex	2700	42.6
	Age (years); mean (SD)	50.4 (12.4)	-
	Ethnicity	Not reported	Not reported
	Cases/selected population	Not reported	Not reported
	Socio-economic status (education)		
	<High school	114	1.8
	High school	1179	18.6
	Some college	1807	28.5
	College graduate school	3157	49.8
	Missing education	82	1.3
	Building characteristics	Not reported	Not reported
Inclusion criteria	Not reported		
Exclusion criteria	Not reported		
Type of pollutant/exposure	Proximity to traffic and $PM_{2.5}$		
Pollutant/exposure assessment	Distance to major roadway was evaluated by determining the distance from home address at the time of the examination to the nearest A1, A2, or A3 road (U.S. Census Features Class). Daily estimates of $PM_{2.5}$ at home address were derived from a model using moderate resolution imaging spectroradiometer satellite-derived aerosol optical thickness measurements at a 10310-km spatial resolution across the Northeast and then resolved to a specific location within a 50350-m grid using land-use terms.		
Outcome			
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between proximity to traffic, PM, respiratory and cardiac conditions		

		Asthma	Wheeze in Past 12 month	Chronic Cough (>3 mo/yr)
		OR (95%CI)	OR (95%CI)	OR (95%CI)
	Distance to roadway in categories (metres)			
	<100	1.18 (0.95, 1.46)	1.02 (0.84, 1.25)	1.22 (0.89, 1.66)
	100 to <200	1.35 (1.06, 1.72)	0.89 (0.70, 1.13)	0.89 (0.61, 1.30)

Bibliographic reference	Rice MB, Ljungman PL, Wilker EH, et al (2015) Long-term exposure to traffic emissions and fine particulate matter and lung function decline in the Framingham heart study. American journal of respiratory and critical care medicine 191(6), 656-64			
	200 to <400	1.26 (1.01, 1.58)	0.94 (0.76, 1.16)	1.17 (0.84, 1.63)
Follow up	16 years			
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average population in the community Selection of the non-exposed cohort • no description of the derivation of the non-exposed cohort Ascertainment of exposure • validated measurements used Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for sex, age, height, weight, education, median household income Outcome Assessment of outcome • questionnaires • self-report no description Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • subjects lost to follow up unlikely to introduce bias **overall risk of bias: moderate:** possible recall bias from self-reported outcomes			
Source of funding	**Government:** Environmental Protection Agency the National Institute for Environmental Health Sciences and the NHLBI			
Comments				

D.1.96 1 Roda 2013

Bibliographic reference	Roda C, Guihenneuc-Jouyaux C, et al (2013) Environmental triggers of nocturnal dry cough in infancy: new insights about chronic domestic exposure to formaldehyde in the PARIS birth cohort. Environmental research 123, 46-51	
Study design	Prospective cohort	
Objective	To examine whether formaldehyde has an impact on nocturnal dry cough during first year of life	
Setting/Study location	France	
Number of participants	2898 infants	
Selected population	No	
Participant characteristics	Sex	
	Male	1486 (51.3%)
	female	1412 (48.7%)
	Maternal age (years)	Not reported
	Ethnicity	Not reported
	SES	
	High	905 (65.7%)
	Intermediate	770 (26.6%)
	Low	223 (7.7%)
	Annual family income	Not reported
	Building characteristics	Not reported
Inclusion criteria	Healthy full-term infants	
Exclusion criteria	None	
Type of pollutant/exposure	Formaldehyde	
Pollutant/exposure assessment	Formaldehyde was measured using a passive sample placed in the infant's bedroom for 7 days and an annual exposure level calculated.	
Outcome	Nocturnal dry cough apart from cold or chest infection	
Results	Formaldehyde exposure	aOR (95%CI)
	With parental history of allergy	1.14 (0.88, 1.49)
	Without parental history of allergy	1.45 (1.08, 1.96)
	Gas heating	
	With parental history of allergy	0.78 (0.56, 1.09)
	Without parental history of allergy	1.01 (0.69, 1.46)
	Used mattress	
	With parental history of allergy	1.47 (1.00, 2.17)
	Without parental history of allergy	1.22 (0.80, 1.88)
Follow up	12 months	
Newcastle-Ottawa Scale	Selection Representativeness of the exposed cohort • truly representative of the average infant in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort t Ascertainment of exposure	

Bibliographic reference	**Roda C, Guihenneuc-Jouyaux C, et al (2013) Environmental triggers of nocturnal dry cough in infancy: new insights about chronic domestic exposure to formaldehyde in the PARIS birth cohort. Environmental research 123, 46-51**
	• Objective sampling) Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for environmental tobacco smoke • study controls for other factors as follows – SES, gender, breastfeeding, number of episodes of lower respiratory infections. Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • subjects lost to follow up unlikely to introduce bias - description provided of those lost) **Overall level of bias – Moderate** (concerns over self-report of outcomes)
Source of funding	**Government:** Paris Council, French National Agency for Food, Environment and Occupational health safet6y (Anses), French Institute for Public health Surveillance (InVS)
Comments	

D.1.97 Samet 1993

Bibliographic reference	**Samet J M, Lambert W E, Skipper B J et.al (1993) Nitrogen dioxide and respiratory illnesses in infants. The American review of respiratory disease 148(5), 1258-65**				
Study design	Prospective cohort study				
Objective	To test the hypothesis that exposure to NO_2 indoors increases the incidence and severity of respiratory infections during the first 18 months of life				
Setting/Study location	United states				
Number of participants	1,205 infants				
Selected population	No				
Participant characteristics	Description	Gas stove		Electric stove	
		No.	%	No.	%
	Sex				
	Male	489	51.4	138	54.5

Bibliographic reference	**Samet J M, Lambert W E, Skipper B J et.al (1993) Nitrogen dioxide and respiratory illnesses in infants. The American review of respiratory disease 148(5), 1258-65**				
	Female	463	48.6	115	45.5
	Age (years)	Not reported		Not reported	
	Ethnicity				
	Hispanic	380	39.9	78	30.8
	Non-Hispanic white	494	51.9	166	65.6
	Other	78	8.2	9	3.6
	Maintenance medication use	Not reported		Not reported	
	Parental asthma and/or atopic	Not reported		Not reported	
	Parental education				
	Maternal (years)				
	≤ 12	372	39.1	56	22.1
	13 – 15	327	34.3	85	33.6
	≥ 16	253	26.6	112	44.3
	Annual family income ($)				
	< 10, 000	117	12.3	11	4.4
	10, 000-19,000	227	23.8	30	12.0
	20, 000-29,000	226	23.7	53	20.9
	30, 000-39,000	186	19.5	60	23.7
	≥ 40,000	197	20.7	99	39.0
	Building characteristics				
	Single family				
	Unattached	686	72.1	205	81.0
	Single family				
	Attached	59	6.2	10	4.0
	Multifamily	108	11.3	35	13.8
	Mobile home	96	10.1	3	1.2
Inclusion criteria	Healthy term births Non-smoking mother and no other family member smoking inside the home Caring for the child at home Telephone in the residence Mother older than 18 years of age and English speaking No plans to move from study area				
Exclusion criteria	Not reported				

<table>
<tr><th>Bibliographic reference</th><th colspan="4">Samet J M, Lambert W E, Skipper B J et.al (1993) Nitrogen dioxide and respiratory illnesses in infants. The American review of respiratory disease 148(5), 1258-65</th></tr>
<tr><td>Type of pollutant/exposure</td><td colspan="4">NO_2 from cooking appliances with electric stove as reference category</td></tr>
<tr><td>Pollutant/exposure assessment</td><td colspan="4">NO_2 concentrations were obtained with passive diffusion samplers (Palmes tubes). In homes with gas stoves, the child’s bedroom was monitored every 2-week year round; during the colder seasons, additional 2-week measurements were made every other month in the kitchen and the activity room. In homes with electric stoves, the child’s bedroom was monitored every other 2-week cycle year round. Consecutive 2-week measurements of outdoor concentrations were obtained at 11 monitoring sites</td></tr>
<tr><td>Health outcome</td><td colspan="4">Respiratory illness defined as the presence of at least two consecutive days of any: runny or stuffy nose, wet cough, dry cough, wheeze, or trouble breathing. Illness events ended with two consecutive symptom-free days.</td></tr>
<tr><td rowspan="4">Results</td><td colspan="4">Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for NO_2 exposure and incidence of respiratory illness (RI)</td></tr>
<tr><td></td><td>All RI</td><td>Wet cough</td><td>Wheezing</td></tr>
<tr><td></td><td>aOR (95%CI)</td><td>aOR (95%CI)</td><td>aOR (95%CI)</td></tr>
<tr><td>Gas stove</td><td>0.98 (0.90, 1.07)</td><td>0.94 (0.82, 1.07)</td><td>0.84 (0.64, 1.09)</td></tr>
<tr><td>Follow up</td><td colspan="4">18 months</td></tr>
<tr><td>Risk of bias (Newcastle-Ottawa Scale)</td><td colspan="4">Selection
Representativeness of the exposed cohort
• truly representative of the average infant in the community
Selection of the non-exposed cohort
• drawn from the same community as the exposed cohort
Ascertainment of exposure
• objective measurement
Demonstration that outcome of interest was not present at start of study
• Yes
Comparability
Comparability of cohorts on the basis of the design or analysis
• study controls for parental atopy and asthma
• study controls for other factors as follows - Age, gender, ethnicity, birth order, day care, income, breastfeeding, maternal education, maternal symptom reporting and season
Outcome
Assessment of outcome
• independent blind assessment
record linkage
• self-report
Was follow-up long enough for outcomes to occur
Yes
Adequacy of follow up of cohorts
• subjects lost to follow up unlikely to introduce bias - description provided of those lost)
Overall level of bias – Low</td></tr>
</table>

Bibliographic reference	**Samet J M, Lambert W E, Skipper B J et.al (1993) Nitrogen dioxide and respiratory illnesses in infants. The American review of respiratory disease 148(5), 1258-65**
Source of funding	**Government:** Research was conducted under contract to the Health Effects Institute (HEI), an organisation funded by the U.S. Environmental Protection Agency (EPA) **Industry:** Research was conducted under contract to the Health Effects Institute (HEI), an organisation funded by automobile manufacturers, and the Gas Research Institute (GRI).
Comments	Study suggests that NO_2 exposure from gas stove does not adversely affect the respiratory health of children during the first 18 months of life.
Additional references	Samet JM, Marbury MC, and Spengler JD (1987) Health Effects and Sources of Indoor Air Pollution. Part I. American Review of Respiratory Disease 136(6), 1486-1508

D.1.98 Sbihi 2016

Bibliographic reference	**Sbihi Hind, Tamburic Lillian, Koehoorn Mieke, and Brauer Michael (2016) Perinatal air pollution exposure and development of asthma from birth to age 10 years. The European respiratory journal 47(4), 1062-71**				
Study design	Prospective cohort study				
Objective	To examine whether perinatal air pollution exposure affected asthma onset during “pre-school and “school age” periods in a population-based birth cohort				
Setting/Study location	Canada				
Number of participants	68195 children				
Participant characteristics		Pre-school		School age	
		Cases	Control	Cases	Control
	Description	No. (%)	No. (%)	No. (%)	No. (%)
	Sex (male) sex	4302 (62)	21478 (62)	5097 (59)	32642 (51)
	Age (maternal, years); mean (SD)	31.2±5.09	31.5±5.06	31.5±5.12	31.4±5.06
	Ethnicity	Not reported	Not reported	Not reported	Not reported
	Cases/selected population	Not reported	Not reported	Not reported	Not reported

<table>
<tr><th>Bibliographic reference</th><th colspan="5">Sbihi Hind, Tamburic Lillian, Koehoorn Mieke, and Brauer Michael (2016) Perinatal air pollution exposure and development of asthma from birth to age 10 years. The European respiratory journal 47(4), 1062-71</th></tr>
<tr><td rowspan="6"></td><td colspan="5">Socio-economic status (maternal post-secondary education quartiles)</td></tr>
<tr><td>1 (lowest)</td><td>1882 (27)</td><td>7670 (22)</td><td>1959 (22)</td><td>13982 (22)</td></tr>
<tr><td>2</td><td>1622 (23)</td><td>7973 (23)</td><td>1996 (23)</td><td>14365 (23)</td></tr>
<tr><td>3</td><td>1781 (26)</td><td>9407 (27)</td><td>2270 (27)</td><td>17371 (27)</td></tr>
<tr><td>4</td><td>1663 (24)</td><td>9571 (28)</td><td>2352 (28)</td><td>17825 (28)</td></tr>
<tr><td>Building characteristics</td><td>Not reported</td><td>Not reported</td><td>Not reported</td><td>Not reported</td></tr>
<tr><td>Inclusion criteria</td><td colspan="5">Not reported</td></tr>
<tr><td>Exclusion criteria</td><td colspan="5">Not reported</td></tr>
<tr><td>Type of pollutant/exposure</td><td colspan="5">Proximity to traffic</td></tr>
<tr><td>Pollutant/exposure assessment</td><td colspan="5">Exposure to air pollution for each cohort member was assigned at their residential six-digit postal code(s), which corresponds to one block-face in urban areas (typically 100–150 m), by three different approaches: land use regression (LUR) models, interpolation of regulatory monitoring data (BC Ministry of Environment and Metro Vancouver) and proximity measures.</td></tr>
<tr><td>Outcome</td><td colspan="5">Asthma</td></tr>
<tr><td rowspan="5">Results</td><td colspan="5">Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between proximity to traffic and asthma onset</td></tr>
<tr><td colspan="2"></td><td colspan="2">Asthma pre-school</td><td>Asthma school age</td></tr>
<tr><td colspan="2"></td><td colspan="2">aOR (95%CI)</td><td>aOR (95%CI)</td></tr>
<tr><td colspan="2">Within 50 m of highway</td><td colspan="2">1.25 (1.04, 1.49)</td><td>0.81 (0.55, 1.19)</td></tr>
<tr><td colspan="2">Within 150 m of major road</td><td colspan="2">1.03 (0.98, 1.09)</td><td>1.04 (0.92, 1.16)</td></tr>
<tr><td>Follow up</td><td colspan="5">10 years</td></tr>
<tr><td>Study methods</td><td colspan="5">Asthma diagnoses were identified from physician billing and hospital discharge records, obtained from the BC Ministry of Health. Using a validated case definition of asthma, children with a minimum of two primary-care physician diagnoses or one hospital admission in a rolling 12-month period were identified as asthma cases.
Each asthma case was randomly matched to five controls and analysed with nested conditional logistic regression models adjusting for possible confounders</td></tr>
<tr><td>Risk of bias (Newcastle-Ottawa Scale)</td><td colspan="5">Selection
Representativeness of the exposed cohort
• truly representative of the average population in the community
Selection of the non-exposed cohort
• drawn from the same community as the exposed cohort
Ascertainment of exposure
• validated measurement used
Demonstration that outcome of interest was not present at start of study
• Yes
Comparability
Comparability of cohorts on the basis of the design or analysis</td></tr>
</table>

Bibliographic reference	Sbihi Hind, Tamburic Lillian, Koehoorn Mieke, and Brauer Michael (2016) Perinatal air pollution exposure and development of asthma from birth to age 10 years. The European respiratory journal 47(4), 1062-71
	• study controls for breastfeeding status at the time of discharge, parity, maternal education, household income, gestational length and birthweight Outcome Assessment of outcome • record linkage • physician billing Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • subjects lost to follow up unlikely to introduce bias **Overall risk of bias: low**
Source of funding	**Government:** Health Canada via an agreement with the British Columbia Centre for Disease Control. Additional support was provided by the Centre for Health and Environment Research at the University of British Columbia, funded by the Michael Smith Foundation for Health Research. H. Sbihi was funded by a Canadian Institutes of Health Research Banting and Best doctoral award
Comments	

D.1.99 Sherriff 2005

Bibliographic reference	Sherriff A, Farrow A, Golding J, and Henderson J (2005) Frequent use of chemical household products is associated with persistent wheezing in pre-school age children. Thorax 60(1), 45-9
Study design	Prospective cohort study
Objective	To examine the effect of prenatal exposure to multiple chemical agents on patterns of wheeze (never wheezed, transient early wheeze, persistent wheeze, late onset wheeze) during the first 3.5 years of life
Setting/Study location	United Kingdom
Number of participants	14,541 pregnant women
Selected population	No
Participant characteristics	Description Sex: Not reported Age Ethnicity: Up to 4 years Education: Not reported
Inclusion criteria	Expected date of delivery between April 1, 1991 and December 31, 1992 Place of residence within the three Bristol-based health districts of the former county of Avon, UK
Exclusion criteria	Not reported
Type of pollutant/exposure	Total chemical burden (TCB) score

Bibliographic reference	Sherriff A, Farrow A, Golding J, and Henderson J (2005) Frequent use of chemical household products is associated with persistent wheezing in pre-school age children. Thorax 60(1), 45-9	
Pollutant/exposure assessment	Questionnaire	
Outcome	Wheeze in child	
Results		TCB burden during pregnancy
	Early-onset transient wheeze	1.01 (0.99 to 1.02)
	Early onset persistent wheeze	1.06 (1.03 to 1.09)
	Late onset wheeze	1.02 (0.98 to 1.06)
Follow up	4 years	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • selected group of pregnant women Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • questionnaire Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for weekend exposure to environmental tobacco smoke at 6 months • study controls for any additional factors -, maternal smoking during pregnancy, maternal history of asthma, maternal parity, crowding in the home, sex, contact with pets, damp housing, maternal age at delivery, maternal educational attainment, housing tenure, hours mother worked outside home, month of returning chemical usage questionnaire, and duration of breastfeeding.) Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias: High** (concerns over self-report of exposure and outcomes)	
Source of funding	**Government:** The Department of Health, and the Department of the Environment. Medical Research Council, **Charity:** the Wellcome Trust, **Academic**: University of Bristol,	
Comments	The composite household chemical exposure (CHCE) comprises of 11 different products (disinfectant; bleach; carpet cleaner; window cleaner; dry cleaning fluid; aerosols, turpentine/white spirit, air fresheners (spray, stick or aerosol); paint stripper; paint or varnish; and pesticides/insect killers) . A simple score for frequency of use of each product was derived: 0 for not at all; 1 for less than once a week; 2 for about once a week; 3 for most days;	

Bibliographic reference	Sherriff A, Farrow A, Golding J, and Henderson J (2005) Frequent use of chemical household products is associated with persistent wheezing in pre-school age children. Thorax 60(1), 45-9
	and 4 for every day. The scores for each product were summed to produce a composite household chemical exposure (CHCE) score for each respondent

D.1.100 Shmuel 2017

Bibliographic reference	Shmuel S, White AJ, and Sandler DP (2017) Residential exposure to vehicular traffic-related air pollution during childhood and breast cancer risk. Environmental Research 159, 257-263				
Study design	Prospective cohort study				
Objective					
Setting/Study location	United States and Puerto Rico				
Number of participants	42,934 adults				
Selected population	No				
Participant characteristics		Cases		Non-cases	
	Description	No.	%	No.	%
	Sex	Not reported	Not reported	Not reported	Not reported
	Age (years)				
	<50	464	23	11,499	28
	50 - <55	359	18	8,028	20
	55 - <60	402	20	8,196	20
	60 - <65	377	19	6,217	15
	65+	426	21	6,966	17
	Ethnicity				
	Non-Hispanic, White	1,760	87	34,623	85
	Non-Hispanic, Black	143	7	3,413	8
	Hispanic	67	3	1,866	5
	Other	58	3	1,004	2
	Cases/selected population	Not reported	Not reported	Not reported	Not reported
	Socio-economic status (education)				
	High School or Less	1,076	53	22,088	54
	Some College	409	20	7,726	19

<table>
<tr><th>Bibliographic reference</th><th colspan="4">Shmuel S, White AJ, and Sandler DP (2017) Residential exposure to vehicular traffic-related air pollution during childhood and breast cancer risk. Environmental Research 159, 257-263</th></tr>
<tr><td></td><td>Bachelor's Degree</td><td>336</td><td>17</td><td>6,752</td><td>17</td></tr>
<tr><td></td><td>Graduate Degree</td><td>207</td><td>10</td><td>4,340</td><td>11</td></tr>
<tr><td></td><td>Building characteristics</td><td>Not reported</td><td>Not reported</td><td>Not reported</td><td>Not reported</td></tr>
<tr><td>Inclusion criteria</td><td colspan="5">Participants with one sister who had been diagnosed with breast cancer but had not been diagnosed with breast cancer themselves at the time of enrolment</td></tr>
<tr><td>Exclusion criteria</td><td colspan="5">Not reported</td></tr>
<tr><td>Type of pollutant/exposure</td><td colspan="5">Proximity to traffic</td></tr>
<tr><td>Pollutant/exposure assessment</td><td colspan="5">Participants completed a Computer-Assisted Telephone Interview in which they reported information on characteristics of their longest lived residence before age 14, including information on nearby roads and exposure to traffic. Participants were asked about the number of lanes, presence of a median or barrier dividing the road (‘yes’/‘no’), and traffic volume during rush hour (‘very light,’ ‘light,’ ‘moderate,’ ‘heavy,’ ‘very heavy,’ which were combined as ‘light,’ ‘moderate,’ and ‘heavy’ for most analyses) for their residential road</td></tr>
<tr><td>Outcome</td><td colspan="5">Breast cancer</td></tr>
<tr><td>Results</td><td colspan="5">Adjusted hazard ratios (aHRs) and 95% confidence intervals (CIs) for association between proximity to traffic and breast cancer</td></tr>
<tr><td></td><td colspan="5">Distance of residence to nearest road and number of lanes on intersecting</td></tr>
<tr><td></td><td colspan="3"></td><td colspan="2">Total breast cancer</td></tr>
<tr><td></td><td colspan="3"></td><td colspan="2">aHR (95%CI)</td></tr>
<tr><td></td><td colspan="3">100 ft. +</td><td colspan="2">REF</td></tr>
<tr><td></td><td colspan="3">Within 100 ft. 1–2 Lanes</td><td colspan="2">0.9 (0.8, 1.0)</td></tr>
<tr><td></td><td colspan="3">Within 100 ft. 3+ Lanes</td><td colspan="2">1.1 (0.9, 1.4)</td></tr>
<tr><td>Follow up</td><td colspan="5">6.3 years</td></tr>
<tr><td>Study methods</td><td colspan="5">Incident breast cancer diagnoses were ascertained from annual health updates and biennial/triennial questionnaires that participants completed during follow-up. Women who reported a diagnosis during follow-up were asked for consent to review their medical records for confirmation and for diagnostic and treatment details.
Cox proportional hazards models were used to estimate the association between characteristics of the primary childhood residence and incident breast cancer adjusting for possible confounders</td></tr>
<tr><td>Risk of bias (Newcastle-Ottawa Scale)</td><td colspan="5">Selection
Representativeness of the exposed cohort
truly representative of the average population in the community
Selection of the non-exposed cohort
drawn from the same community as the exposed cohort
Ascertainment of exposure
questionnaires on residential proximity to traffic
Demonstration that outcome of interest was not present at start of study</td></tr>
</table>

Bibliographic reference	Shmuel S, White AJ, and Sandler DP (2017) Residential exposure to vehicular traffic-related air pollution during childhood and breast cancer risk. Environmental Research 159, 257-263
	Yes Comparability Comparability of cohorts on the basis of the design or analysis study controls for age, race/ethnicity and highest level of education attained in the household at age 13 Outcome Assessment of outcome record linkage and treatment details self-report Was follow-up long enough for outcomes to occur Yes Adequacy of follow up of cohorts subjects lost to follow up unlikely to introduce bias Overall risk of bias: moderate: possibility of over or underestimating traffic exposure stemming from self-reporting traffic exposure
Source of funding	Study was supported by the Intramural Research Program of the NIH, National Institute of Environmental Health Sciences [Z01- ES044005]; and the NIEHS grant [T32ES007018]
Comments	

D.1.101 Shu 2013

Bibliographic reference	Shu H, Jönsson BA, Larsson M, et al. (2006) PVC flooring at home and development of asthma among young children in Sweden, a 10-year follow-up. Indoor Air. 24(3): 227-35. doi: 10.1111/ina.12074.
Study design	Prospective cohort study
Objective	To investigate whether PVC flooring in the home of children between 1 and 5 years old is associated with the development of asthma at 5- and 10-year follow-up investigations.
Setting/Study location	Varmland, Sweden
Number of dwellings and participants	Number of dwellings: Not reported Number of participants: 3,228 children
Building and Participant characteristics	Building characteristics: Location: unclear Dwelling type: single family, 80.9%; attached or semi-attached, 8.6%; flat/apartment/multifamily, 8.3%; other, 2.2% Building age: not reported Type of ownership/tenancy: not reported Participant characteristics:

Bibliographic reference	**Shu H, Jönsson BA, Larsson M, et al. (2006) PVC flooring at home and development of asthma among young children in Sweden, a 10-year follow-up. Indoor Air. 24(3): 227-35. doi: 10.1111/ina.12074.**
	Sex: 50.3% male Age: not reported Smokers in the family: mother, 10.1%; father, 9.3% Asthma or allergies in the family: 57%
Inclusion criteria	Preschool children in the county of Varmland in Sweden, were included. No further details were provided.
Exclusion criteria	Not reported
Building factor/exposure	PVC flooring vs. other flooring
Building factor/exposure assessment	Building factors were ascertained by asking participants to complete a self-reported questionnaire.
Outcome	Doctor diagnosed asthma
Results	See results table below
Follow up	10 years
Newcastle-Ottawa Scale	Selection Representativeness of the exposed cohort • selected group – preschool children in the county of Varmland in Sweden Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • self-reported Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study adjusts for age, sex, allergies in family, single parent households, smoking in the family, and housing type. Outcome Assessment of outcome • self-reported but the questionnaire question was asked in such a way, it is unlikely to have introduced bias Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias: Moderate** (concerns over self-report of exposure)

Results:

Building characteristic	Odds ratio (95%CI)	
	5 years	10 years
Child's bedroom		
PVC vs. other flooring material	1.50 (0.91, 2.47)	1.54 (1.06, 2.23)
PVC vs. wood flooring material	1.54 (1.06, 2.23)	1.37 (0.92, 2.04)
Parent's bedroom		
PVC vs. other flooring material	1.71 (1.05, 2.80)	2.04 (1.41, 2.94)
PVC vs. wood flooring material	1.60 (1.29, 2.81)	1.90 (1.29, 2.81)

Bibliographic reference	**Shu H, Jönsson BA, Larsson M, et al. (2006) PVC flooring at home and development of asthma among young children in Sweden, a 10-year follow-up. Indoor Air. 24(3): 227-35. doi: 10.1111/ina.12074.**
Source of funding	**Government:** Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning **Charity:** Swedish Asthma and Allergy Associations Research Foundation
Comments	None

D.1.102 Smith 2000

Bibliographic reference	**Sorensen M, Andersen A-M, and Raaschou-Nielsen O (2010) Non-occupational exposure to paint fumes during pregnancy and fetal growth in a general population. Environmental research 110(4), 383-7**				
Study design	Prospective cohort study				
Objective	To investigate the association between exposure to paint fumes in the residence during pregnancy and birth weight, small for gestational age (SGA) and preterm births in a national prospective birth cohort.				
Setting/Study location	Denmark				
Number of participants	19,000 women				
Selected population	No				
		Exposed to paint fumes		Not exposed to paint fumes	
Participant characteristics	Description	No.	%	No.	%
	Sex	All female	All female	All female	All female
	Age (years); mean (SD)	29.0 (4.3)	-	29.6 (4.3)	-
	Ethnicity	Not reported	Not reported	Not reported	Not reported
	Cases/selected population	Pregnant women	Pregnant women	Pregnant women	Pregnant women
	Socio-economic status (education)	Not reported	Not reported	Not reported	Not reported
	Building characteristics	Not reported	Not reported	Not reported	Not reported
Inclusion criteria	Women who gave birth to live-born singletons Available information on birth weight Not occupationally exposed to organic solvents				
Exclusion criteria	Not reported				
Type of pollutant/exposure	Exposure to paint fumes				
Pollutant/exposure assessment	During the second prenatal telephone interview, participants were asked questions regarding the use of paint in their residence. They were asked if any painting had been done in their residence during pregnancy and if so, what rooms				

<table>
<tr><th>Bibliographic reference</th><th colspan="3">Sorensen M, Andersen A-M, and Raaschou-Nielsen O (2010) Non-occupational exposure to paint fumes during pregnancy and fetal growth in a general population. Environmental research 110(4), 383-7</th></tr>
<tr><td></td><td colspan="3">had been painted, if they painted ‘‘furniture, floor, radiator and/or woodwork’’ or ‘‘wall and/or ceiling’’, and when the painting was done. Furthermore, the women were asked if they were present in the room for two or more hours during painted.</td></tr>
<tr><td>Outcome</td><td colspan="3">Small for gestational age (SGA) and preterm birth</td></tr>
<tr><td rowspan="5">Results</td><td colspan="3">Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between exposure to paint fumes in the residence during pregnancy and small for gestational age (SGA) and preterm birth</td></tr>
<tr><td></td><td>Small for gestational age</td><td>Preterm birth</td></tr>
<tr><td></td><td>aOR (95%CI)</td><td>aOR (95%CI)</td></tr>
<tr><td>Not exposed to paint fumes</td><td>1.00</td><td>1.00</td></tr>
<tr><td>Exposed to paint fumes</td><td>0.89 (0.81, 0.98)</td><td>0.95 (0.82, 1.11)</td></tr>
<tr><td>Follow up</td><td colspan="3">6 years</td></tr>
<tr><td>Study methods</td><td colspan="3">SGA births were defined as those with birth weights below the 10th percentile of the cohort, stratified by sex, for each week of gestation. Preterm birth was defined as birth before the 37th week of gestation.
Authors used general and multiple linear regressions models (proc GLM, SAS) to test for associations between exposure to paint fumes and birth weight and adjusted for confounding factors.</td></tr>
<tr><td>Risk of bias (Newcastle-Ottawa Scale)</td><td colspan="3">Selection
Representativeness of the exposed cohort
• truly representative of the average female population in the community
Selection of the non-exposed cohort
• drawn from the same community as the exposed cohort
Ascertainment of exposure
• structured interview
• self-report
Demonstration that outcome of interest was not present at start of study
• Yes
Comparability
Comparability of cohorts on the basis of the design or analysis
• Study controls for smoking in 30th pregnancy week, maternal age, maternal pre-pregnancy BMI, parity (nulliparous, uniparous or multiparous) and occupational status.
Outcome
Assessment of outcome
• Information on birth weight and gestational age was obtained from the Danish National Birth Register and the Danish National Discharge Registry, respectively. Gestational age was recorded by midwives at birth
Was follow-up long enough for outcomes to occur
• Yes
Adequacy of follow up of cohorts
• subjects lost to follow up unlikely to introduce bias
Overall risk of bias: Low</td></tr>
</table>

Bibliographic reference	**Sorensen M, Andersen A-M, and Raaschou-Nielsen O (2010) Non-occupational exposure to paint fumes during pregnancy and fetal growth in a general population. Environmental research 110(4), 383-7**
Source of funding	**Government:** The Danish Agency for Science, Technology and Innovation. **Charity:** The Danish National Research Foundation, Pharmacy Foundation, the Egmont Foundation, the March of Dimes Birth Defects Foundation, the Augustinus Foundation, and the Health Foundation.
Comments	

D.1.103 Sorensen 2010

Bibliographic reference	**Sorensen M, Andersen A-M, and Raaschou-Nielsen O (2010) Non-occupational exposure to paint fumes during pregnancy and fetal growth in a general population. Environmental research 110(4), 383-7**				
Study design	Prospective cohort study				
Objective	To investigate the association between exposure to paint fumes in the residence during pregnancy and birth weight, small for gestational age (SGA) and preterm births in a national prospective birth cohort.				
Setting/Study location	Denmark				
Number of participants	19,000 women				
Selected population	No				
		Exposed to paint fumes		Not exposed to paint fumes	
Participant characteristics	Description	No.	%	No.	%
	Sex	All female	All female	All female	All female
	Age (years); mean (SD)	29.0 (4.3)	-	29.6 (4.3)	-
	Ethnicity	Not reported	Not reported	Not reported	Not reported
	Cases/selected population	Pregnant women	Pregnant women	Pregnant women	Pregnant women
	Socio-economic status (education)	Not reported	Not reported	Not reported	Not reported
	Building characteristics	Not reported	Not reported	Not reported	Not reported
Inclusion criteria	Women who gave birth to live-born singletons Available information on birth weight Not occupationally exposed to organic solvents				
Exclusion criteria	Not reported				

<table>
<tr><th>Bibliographic reference</th><th colspan="3">Sorensen M, Andersen A-M, and Raaschou-Nielsen O (2010) Non-occupational exposure to paint fumes during pregnancy and fetal growth in a general population. Environmental research 110(4), 383-7</th></tr>
<tr><td>Type of pollutant/exposure</td><td colspan="3">Exposure to paint fumes</td></tr>
<tr><td>Pollutant/exposure assessment</td><td colspan="3">During the second prenatal telephone interview, participants were asked questions regarding the use of paint in their residence. They were asked if any painting had been done in their residence during pregnancy and if so, what rooms had been painted, if they painted ‘‘furniture, floor, radiator and/or woodwork’’ or ‘‘wall and/or ceiling’’, and when the painting was done. Furthermore, the women were asked if they were present in the room for two or more hours during painted.</td></tr>
<tr><td>Outcome</td><td colspan="3">Small for gestational age (SGA) and preterm birth</td></tr>
<tr><td rowspan="5">Results</td><td colspan="3">Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between exposure to paint fumes in the residence during pregnancy and small for gestational age (SGA) and preterm birth</td></tr>
<tr><td></td><td>Small for gestational age</td><td>Preterm birth</td></tr>
<tr><td></td><td>aOR (95%CI)</td><td>aOR (95%CI)</td></tr>
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<tr><td>Exposed to paint fumes</td><td>0.89 (0.81, 0.98)</td><td>0.95 (0.82, 1.11)</td></tr>
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<tr><td>Study methods</td><td colspan="3">SGA births were defined as those with birth weights below the 10th percentile of the cohort, stratified by sex, for each week of gestation. Preterm birth was defined as birth before the 37th week of gestation.
Authors used general and multiple linear regressions models (proc GLM, SAS) to test for associations between exposure to paint fumes and birth weight and adjusted for confounding factors.</td></tr>
<tr><td>Risk of bias (Newcastle-Ottawa Scale)</td><td colspan="3">Selection
Representativeness of the exposed cohort
• truly representative of the average female population in the community
Selection of the non-exposed cohort
• drawn from the same community as the exposed cohort □
Ascertainment of exposure
• structured interview
• self-report
Demonstration that outcome of interest was not present at start of study
• Yes
Comparability
Comparability of cohorts on the basis of the design or analysis
• Study controls for smoking in 30th pregnancy week, maternal age, maternal pre-pregnancy BMI, parity (nulliparous, uniparous or multiparous) and occupational status.
Outcome
Assessment of outcome
• Information on birth weight and gestational age was obtained from the Danish National Birth Register and the Danish National Discharge Registry, respectively. Gestational age was recorded by midwives at birth
Was follow-up long enough for outcomes to occur</td></tr>
</table>

Bibliographic reference	**Sorensen M, Andersen A-M, and Raaschou-Nielsen O (2010) Non-occupational exposure to paint fumes during pregnancy and fetal growth in a general population. Environmental research 110(4), 383-7**
	• Yes Adequacy of follow up of cohorts • subjects lost to follow up unlikely to introduce bias **Overall risk of bias: Low**
Source of funding	**Government:** The Danish Agency for Science, Technology and Innovation. **Charity:** The Danish National Research Foundation, Pharmacy Foundation, the Egmont Foundation, the March of Dimes Birth Defects Foundation, the Augustinus Foundation, and the Health Foundation.
Comments	

D.1.104 Stark 2003

Bibliographic reference	**Stark PC, Burge HA, Ryan LM, et al (2003) Fungal levels in the home and lower respiratory tract illnesses in the first year of life. American journal of respiratory and critical care medicine 168(2), 232-7**	
Study design	Prospective cohort study	
Objective	Too determine if exposure to fungi is associated with lower respiratory illness in the first year of life.	
Setting/Study location	United States	
Number of participants	499 infants	
Selected population	Yes – parental history of asthma or allergy	
Participant characteristics	Description	
	Sex	
	Male	233
	Female	266
	Age (years)- Maternal	Not reported
	18 -<30	124
	30 to<33	125
	33 to<36	125
	36 to<46	125
	Ethnicity	
	White	375
	Back	59
	Hispanic	30
	Asian	28
	Other	7
	Education	Not reported
	Annual family income	Not reported
Inclusion criteria	Not reported	
Exclusion criteria	Not reported	
Type of pollutant/exposure	Water damage or mould/mildew	

Bibliographic reference	**Stark PC, Burge HA, Ryan LM, et al (2003) Fungal levels in the home and lower respiratory tract illnesses in the first year of life. American journal of respiratory and critical care medicine 168(2), 232-7**	
Pollutant/exposure assessment	Indoor air samples were collected from each home using a Burkard culture plate Sequential duplicate 1-min air samples were collected in the bedroom 1–1.5 m above the area of the floor demarcated for dust collection. After sampling, the Petri plates were returned to the laboratory on the same day for incubation High fungal levels defined as > 90th percentile or specific taxon	
Outcome	Lower respiratory illness	
Results		LRI
		aRR (95%CI)
	Water damage or mould/mildew	1.34 (0.99, 1.82)
	High fungal levels	1.86 (1.21, 2.88)
Follow up	1 year	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • selected group of infants at risk of asthma Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • Objective sampling Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for any maternal allergy • study controls for additional factors as follows - male sex, African-American race, fall date of birth, and maternal IgE Outcome Assessment of outcome • independent blind assessment Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall level of bias – Low**	
Source of funding	Government: This study was supported by National Institutes of Health	
Comments		

D.1.105 Stark 2005

Bibliographic reference	**Stark PC, Celedon JC, Chew GL, et al (2005) Fungal levels in the home and allergic rhinitis by 5 years of age. Environmental health perspectives 113(10), 1405-9**	
Study design	Prospective cohort study	
Objective	To evaluate whether high fungal levels were independently associated with doctor-diagnosed allergic rhinitis in the first 5 years of life.	
Setting/Study location	United States	
Number of participants	405 children (< 5 years)	
Selected population	Yes – parental history of asthma or allergy	
Participant characteristics	Description	
	Sex	
	Male	210
	Female	195
	Age (years)- Maternal	Not reported
	Ethnicity	
	White	309
	African American	46
	Hispanic	18
	Asian	26
	Other	6
	Education	Not reported
	Annual family income	Not reported
Inclusion criteria	Residence inside route 128 (a highway encircling the Boston metropolitan area) Maternal age ≥ 18 years History of hay fever, asthma, or allergies in either parent Maternal ability to speak English or Spanish	
Exclusion criteria		
Type of pollutant/exposure	Mould/mildew	
Pollutant/exposure assessment	Indoor air samples were collected from each home using a Burkard culture plate Sequential duplicate 1-min air samples were collected in the bedroom 1–1.5 m above the area of the floor demarcated for dust collection. After sampling, the Petri plates were returned to the laboratory on the same day for incubation High fungal levels defined as > 90th percentile or specific taxon	
Outcome	Allergic rhinitis	
Results	Adjusted hazard ratios (aHRs) and 95% confidence intervals (CIs) for association between exposure to house dust mite, cat allergen, dog allergen and asthma	
		Allergic rhinitis
		aHR (95%CI)
	Water damage or mould/mildew in year	1.66 (0.88, 3.15)

Bibliographic reference	**Stark PC, Celedon JC, Chew GL, et al (2005) Fungal levels in the home and allergic rhinitis by 5 years of age. Environmental health perspectives 113(10), 1405-9**
Follow up	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • selected group of children at high risk of asthma Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • Objective sampling Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for any maternal allergy • study controls for additional factors as follows - male sex, African-American race, fall date of birth, and maternal IgE Outcome Assessment of outcome • independent blind assessment Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for Overall level of bias – Low risk
Source of funding	Government: This study was supported by National Institutes of Health
Comments	

D.1.106 Thacher 2017

Bibliographic reference	**Thacher J D, Gruzieva O, Pershagen G, et al (2017) Mold and dampness exposure and allergic outcomes from birth to adolescence: data from the BAMSE cohort. Allergy 72(6), 967-974**	
Study design	Prospective cohort study	
Objective	To assess whether exposure to mould or dampness during infancy influences the risk of asthma or rhinitis in children followed prospectively from birth to adolescence.	
Setting/Study location	Sweden	
Number of participants	3798 children	
Selected population	No	
Participant characteristics	Age	Not reported
	Sex	

Bibliographic reference	**Thacher J D, Gruzieva O, Pershagen G, et al (2017) Mold and dampness exposure and allergic outcomes from birth to adolescence: data from the BAMSE cohort. Allergy 72(6), 967-974**		
	Male		1593
	Race / ethnicity		Not reported
	SES reported as working status Manual worker Non-manual worker		 488 2655
Inclusion criteria	Children born in selected areas of Stockholm County between February 1994 and November 1996		
Exclusion criteria	Not reported		
Type of pollutant / exposure	Mould Dampness		
Pollutant / exposure assessment	Self-report		
Outcome	Asthma and rhinitis at 1–16 years of age were based on symptoms reported by parents from questionnaires and were defined as follows: Asthma—four or more episodes of wheeze in the last 12 months or one or more episode of wheeze in the last 12 months in combination with inhaled steroids Rhinitis—eye or nose symptoms following exposure to allergens in the last 12 months and/or a doctor's diagnosis of allergic rhinitis (18).		
Results	Exposure	Asthma aOR (95%CI)	Rhinitis aOR (95%CI)
	No mould or dampness indicator 1 indicator 2 indicators 3 indicators	Reference 1.16 (0.93, 1.44) 1.37 (1.01, 1.86) 1.73 (1.10, 2.74)	Reference 1.03 (0.87, 1.22) 1.18 (0.92, 1.52) 1.23 (0.82, 1.85)
Follow up	16 years		
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average child in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • written self-report Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for presence of parental smoking during infancy, • study controls for additional factor - sex, socioeconomic status, parental allergic disease, maternal smoking during pregnancy, maternal age<26 years, and presence of siblings. Outcome Assessment of outcome		

Bibliographic reference	Thacher J D, Gruzieva O, Pershagen G, et al (2017) Mold and dampness exposure and allergic outcomes from birth to adolescence: data from the BAMSE cohort. Allergy 72(6), 967-974
	• clinical diagnosis Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias: Low**
Source of funding	**Government:** The Swedish Research Council, The Swedish Heart and Lung Foundation, The Swedish Research Council for Working Life and Social Welfare, The Swedish Asthma and Allergy Association Research Foundation, The Swedish Research Council Formas, Stockholm County Council, and the European Commission
Comments	Mould or dampness indicators=Mould odour, visible mould, or dampness damage.

D.1.107 Tiesler 2015

Bibliographic reference	**Tiesler C M. T, Thiering E, Tischer C et.al (2015) Exposure to visible mould or dampness at home and sleep problems in children: Results from the LISAplus study. Environmental research 137, 357-63**	
Study design	Prospective cohort study	
Objective	To investigate the association between reported current visible mould or dampness at home and sleep problemsin10-year-oldchildren.	
Setting/Study location	Germany	
Number of participants	1719 children	
Selected population	No	
Participant characteristics	Description	
	Sex	Not reported
	Age (years)	Not reported
	Ethnicity	Not reported
	Education	Not reported
	Annual family income	Not reported
	Building characteristics	
	Owner occupancy	2916 (52%)
	Tenancy	2724 (48%)
	Crowding index	
	<1 (low)	336 (6%)

Bibliographic reference	**Tiesler C M. T, Thiering E, Tischer C et.al (2015) Exposure to visible mould or dampness at home and sleep problems in children: Results from the LISAplus study. Environmental research 137, 357-63**				
	1-<2 (medium) 2+ (high) Building age	4430 (72%) 1345 (2%) Not reported2			
Inclusion criteria	Healthy, full-term neonates born in four German cities (Munich, Leipzig, Wesel and Bad Honnef)				
Exclusion criteria	preterm birth (maturity <37 gestational weeks), low birth weight (<2,500 g), congenital malformation, symptomatic neonatal infection, antibiotic medication, hospitalisation or intensive medical care during neonatal period. new-borns from mothers with immune-related diseases (autoimmune disorders, diabetes, hepatitis B), on long-term medication or who abuse drugs and/or alcohol new-borns from parents with a nationality other than German or who were not born in Germany				
Type of pollutant/exposure	Visible mould or dampness				
Pollutant/exposure assessment	Self-assessment				
Outcome	Sleep problems				
Results		Any sleep problems	Problems to fall asleep	Problems sleeping through the night	Sleep time <9hours
	Visible mould	1.70 (1.13, 2.54)	1.50 (0.97, 2.33)	1.91 (0.89, 4.13)	1.67 (1.06, 2.65)
	Damp	2.59 (1.26, 5.31)	1.39 (0.57, 3.40)	4.30 (1.41, 13.13)	0.69 (0.21, 2.28)
	Visible mould/dampness at home	1.80(1.22, 2.66)	1.50 (0.98, 2.30)	2.36 (1.15, 4.84)	1.60 (1.02, 2.51)
Follow up	10 years				
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average child in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • written self-report Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for sex				

Bibliographic reference	**Tiesler C M. T, Thiering E, Tischer C et.al (2015) Exposure to visible mould or dampness at home and sleep problems in children: Results from the LISAplus study. Environmental research 137, 357-63**
	• study controls for any additional factors as follows – study centre, sex, parental education level and bedroom sharing Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias – High** (concerns over self-report of exposure and outcomes)
Source of funding	Government: Federal Ministry for Education, Science, Research and Technology, Helm-holtz Zentrum Munich (former GSF), Helmholtz Centre for Environmental Research – UFZ, Leipzig,
Comments	

D.1.108 Tin Tin 2016

Bibliographic reference	**Tin Tin S, Woodward A, Saraf R et.al (2016) Internal living environment and respiratory disease in children: findings from the Growing Up in New Zealand longitudinal child cohort study. Environmental health : a global access science source 15(1), 120**	
Study design	Prospective cohort study	
Objective	To investigate the frequency and pattern of exposure to specific home environmental risk factors and to provide updated evidence of the impact of these exposures on the risk of hospital admission with ARIs during the first five years of life.	
Setting/Study location	New Zealand	
Number of participants	6853 children	
Selected population	No	
Participant characteristics	Description	
	Sex	Not reported
	Age (years)-	Not reported
	Ethnicity	Not reported
	Education	Not reported
	Annual family income	Not reported
Inclusion criteria	Pregnant women had to be resident within a geographical region defined by three contiguous District Health Board (DHB) regions in the northern part of the country (Auckland, Counties-Manukau and Waikato), Have an estimated delivery date between 25 April 2009 and 25 March 2010	
Exclusion criteria	Not reported	
Type of pollutant/exposure	Mould or mildew	

Bibliographic reference	**Tin Tin S, Woodward A, Saraf R et.al (2016) Internal living environment and respiratory disease in children: findings from the Growing Up in New Zealand longitudinal child cohort study. Environmental health : a global access science source 15(1), 120**	
	Gas heater Over-crowding tenure	
Pollutant/exposure assessment	Questionnaire	
Outcome	Hospitalization for acute respiratory infections	
Results	Adjusted hazard ratios (aHRs) and 95% confidence intervals (CIs) for association between internal living environment and hospital admission for an acute respiratory infection (ARI) during the first five years of life	
		ARI
		aHR (95%CI)
	Housing tenure Tenancy	1.00 (0.87, 1.16)
	Crowding index 2+ (high)	1.07 (0.91, 1.26)
	Heating the house Yes	0.87 (0.72, 1.05)
	Gas heater only	1.64 (1.29-2.09)
	Unflued gas heater	1.48 (1.05-2.09)
	Gas heater as well as other forms of heating	0.82 (0.68-0.99)
	Unflued gas heater as well as other forms of heating	0.73 (0.57-0.94)
	Heating used in the room where child sleeps	
	No heating	
	Yes	0.82 (0.67, 1.00)
	No	1.00
	Dampness of the house	
	Never or hardly ever	1.00
	Not very often	0.96 (0.83-1.13)
	Quite often	1.13 (0.94-1.36)
	Always or almost always	1.15 (0.89, 1.50)
	Heavy condensation in the room where child sleeps at night	
	Never or hardly ever	1.00
	Not very often	1.01 (0.86-1.17)
	Quite often	1.05 (0.88-1.27)
	Always or almost always	1.00 (0.77, 1.31)
	Mould or mildew in the walls or ceilings in the room where child sleeps at night in the past two weeks	
	Yes	0.81 (0.67, 0.99)
Follow up	5 years	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort truly representative of the average child in the community Selection of the non-exposed cohort	

Bibliographic reference	Tin Tin S, Woodward A, Saraf R et.al (2016) Internal living environment and respiratory disease in children: findings from the Growing Up in New Zealand longitudinal child cohort study. Environmental health : a global access science source 15(1), 120
	• drawn from the same community as the exposed cohort Ascertainment of exposure • self-report Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for maternal history of asthma • study controls for additional factors as follows – Maternal factors (age, ethnicity, education, area of residence, neighbourhood deprivation, pre-pregnancy BMI, pre-pregnancy self-rated health, history use of supplements, maternal smoking, parity and pregnancy planning) and child factors (gender, gestation, birth-weight, season of birth, proxy-rated health at 9 months, health or developmental problems, feeding practices, time spent outdoors and child immunisation) Outcome Assessment of outcome • record linkage Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias – Moderate** (concerns over self-report of exposure)
Source of funding	Government: New Zealand Ministries of Social Development, Health, Education, Justice and Pacific Island Affairs; the former Ministry of Science Innovation and the former Department of Labour (now both part of the Ministry of Business, Innovation and Employment); the former Ministry of Women's Affairs (now the Ministry for Women); the Department of Corrections; the Families Commission (now known as the Social Policy Evaluation and Research Unit); Te Puni Kokiri; New Zealand Police; Sport New Zealand; the Housing New Zealand Corporation; and the former Mental Health Commission, The University of Auckland and Auckland UniServices Limited. Health Research Council of New Zealand, Statistics New Zealand, the Office of the Children's Commissioner and the Office of Ethnic Affairs.
Comments	

D.1.109 Torrent 2007

Bibliographic reference	Torrent M, Sunyer J, Garcia R, et al (2007) Early-life allergen exposure and atopy, asthma, and wheeze up to 6 years of age. American journal of respiratory and critical care medicine 176(5), 446-53
Study design	Prospective cohort study
Objective	To assess the prospective relationship between exposure to aeroallergens in early life and the development of specific sensitization, wheeze, and asthma up to 6 years of age in non-selected populations

Bibliographic reference	**Torrent M, Sunyer J, Garcia R, et al (2007) Early-life allergen exposure and atopy, asthma, and wheeze up to 6 years of age. American journal of respiratory and critical care medicine 176(5), 446-53**		
Setting/Study location	Spain & UK		
Number of participants	1611 infants		
Selected population	No		
Participant characteristics	Description	No. (%)	
	Sex Ethnicity Annual family income Building characteristics	Not reported Not reported Not reported Not reported	
Inclusion criteria	Mothers delivering babies		
Exclusion criteria	Smoking in the household Infant death or adoption Maternal age <19 years Non-English speaking mother Prior participation Plans to move out of study area Having a multiple gestation Having no address or phone number		
Type of pollutant/exposure	Allergens SES NO_2		
Pollutant/exposure assessment	Questionnaire and home inspection		
Outcome	Asthma Wheeze		
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs)		
		Asthma	Persistent wheeze
		aOR (95%CI)	aOR (95%CI)
	SES (maternal social class) Skilled nonmanual Skilled manual Unskilled	 0.56 (0.26–1.21) 0.74 (0.42–1.30) 0.75 (0.40–1.43)	 0.49 (0.19–1.26) 0.94 (0.49–1.79) 1.52 (0.76–3.03)
	NO_2, 10 μg/m^3	1.53 (0.87–2.70)	Not reported
	Der p1 concentration 0.83–6.46 μg/g >6.46 μg/g	 0.67 (0.40–1.12) 0.68 (0.37–1.25)	 0.59 (0.32–1.08) 0.74 (0.38–1.46)
	Fel d1 concentration 0.25–1.39 μg/g >1.39 μg/g	 1.59 (0.75–3.36) 2.6 1(.27–5.34)	 0.73 (0.34–1.54) 1.56 (0.79–3.08)

Bibliographic reference	**Torrent M, Sunyer J, Garcia R, et al (2007) Early-life allergen exposure and atopy, asthma, and wheeze up to 6 years of age. American journal of respiratory and critical care medicine 176(5), 446-53**
Follow up	6 years
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average infant Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • written self-report Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for maternal atopy and maternal asthma, home crowding Outcome Assessment of outcome • self-report (wheeze • physician diagnosis (asthma) Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall level of bias – Low**
Source of funding	**Government:** Spanish Ministry of Health, European Community **Charity:** The COLT Foundation
Comments	

D.1.110 Triche 2002

Bibliographic reference	**Triche EW, Belanger K, Beckett W, et al (2002) Infant respiratory symptoms associated with indoor heating sources. American Journal of Respiratory and Critical Care Medicine 166(8), 1105-1111**	
Study design	Prospective cohort study	
Objective	To examine the effect of secondary home heating on respiratory symptoms	
Setting/Study location	United States	
Number of participants	890 infants	
Selected population	No	
	Description	No. (%)

Bibliographic reference	**Triche EW, Belanger K, Beckett W, et al (2002) Infant respiratory symptoms associated with indoor heating sources. American Journal of Respiratory and Critical Care Medicine 166(8), 1105-1111**		
Participant characteristics	Sex Male female	466 (52%) 423 (48%)	
	Maternal age (years)	Not reported	
	Ethnicity White or Asian Black or Hispanic	696 (78%) 193 (21%)	
	Maternal asthma and/or atopic	80 (9%)	
	Parental education High school or less Some college College graduate or higher	303 (34%) 261 (29%) 325 (39%)	
	Annual family income	Not reported	
	Building characteristics	Not reported	
Inclusion criteria	Mothers delivering babies		
Exclusion criteria	Smoking in the household Infant death or adoption Maternal age <19 years Non-English speaking mother Prior participation Plans to move out of study area Having a multiple gestation Having no address or phone number		
Type of pollutant/exposure	Heating sources: NO_2 Fireplace (FP) Gas space heater (GH) Kerosene heater (KH) Wood stove (WS)		
Pollutant/exposure assessment	Questionnaire and home inspection		
Outcome	Respiratory symptoms (diary)		
Results	Adjusted risk ratios (aRRs) and 95% confidence intervals (CIs) for association between Indoor heating sources and respiratory symptoms		
		Wheeze	Cough
		aRR (95%CI)	aRR (95%CI)
	Average per day FP use	0.25 (0.04, 1.43)	0.99 (0.81, 1.21)
	Average per day WS use	1.08 (0.87, 18.39)	1.10 (1.02, 1.19)
	Average per day GH use	1.25 (1.05, 1.50)	0.94 (0.75, 1.18)
	Average per day KH use	0.90 (0.64, 1.25)	1.01 (0.93, 1.10)
Follow up	12 months		
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort		

Bibliographic reference	**Triche EW, Belanger K, Beckett W, et al (2002) Infant respiratory symptoms associated with indoor heating sources. American Journal of Respiratory and Critical Care Medicine 166(8), 1105-1111**
	• truly representative of the average infant Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • written self-report Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for gas stove use • study controls for additional factors as follows - number of children in household, multifamily dwelling, history of allergies, education, race, state of residence Outcome Assessment of outcome • self-report (maternal) Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall level of bias – Low**
Source of funding	Government: National Institute of Environmental Health Sciences
Comments	

D.1.111 Triche 2005

Bibliographic reference	**Triche E W, Belanger K, Bracken M B, Beckett W S, Holford T R, Gent J F, McSharry J E, and Leaderer B P (2005) Indoor heating sources and respiratory symptoms in non-smoking women. Epidemiology 16(3), 377-384**	
Study design	Prospective cohort study	
Objective	To examine the effects of secondary heating source use on respiratory symptoms.	
Setting/Study location	United States	
Number of participants	888 mothers of infants	
Selected population	No	
Participant characteristics	Description	No. (%)
	Sex	888 (100%)
	Maternal age (years)	Not reported
	Ethnicity White or Asian	693 (78%) 195 (22%)

Bibliographic reference	**Triche E W, Belanger K, Bracken M B, Beckett W S, Holford T R, Gent J F, McSharry J E, and Leaderer B P (2005) Indoor heating sources and respiratory symptoms in non-smoking women. Epidemiology 16(3), 377-384**				
	Black or Hispanic				
	Maternal asthma and/or atopic	Not reported			
	Parental education High school or less Some college College graduate or higher	302 (34%) 257 (29%) 329 (37%)			
	Annual family income	Not reported			
	Building characteristics	Not reported			
Inclusion criteria	Had an infant child				
Exclusion criteria	Smoking in the household Infant death or adoption Maternal age <19 years Prior participation Plans to move out of study area Having a multiple gestation Having no address or phone number				
Type of pollutant/exposure	Heating sources: Fireplace (FP) Gas space heater (GH) Kerosene heater (KH) Wood stove (WS)				
Pollutant/exposure assessment	Palmes tubes were used to passively monitor indoor concentrations of NO_2. SO2 concentrations were measured using a passive monitor consisting of a 37-mm diameter polystyrene sampling cassette with a washed glass fiber treated filter coated with a 2% sodium carbonate solution placed at the bottom. At home interview, the research assistant placed the monitors in the main living area of the home and instructed respondents on their use. Monitors were exposed in the home for 2 weeks.				
Outcome	Respiratory symptoms				
Results	Adjusted risk ratios (aRRs) and 95% confidence intervals (CIs) for association between Indoor heating sources and respiratory symptoms				
		Lower respiratory symptoms			
		Wheezing	Chest tightness	Laryngitis	Phlegm
		aRR (95%CI)	aRR (95%CI)	aRR (95%CI)	aRR (95%CI)
	Fire place use	1.07 (0.97, 1.18)	1.05 (0.99, 1.12)	1.02 (0.94, 1.10)	1.04 (0.99, 1.09)
	Gas space heater use	1.03 (0.94, 1.13)	1.01 (0.96, 1.07)	0.93 (0.79, 1.10)	0.96 (0.88, 1.05)
	Kerosene Heater Use	1.06 (1.01, 1.11)	1.02 (0.99, 1.05)	1.01 (0.97, 1.04)	0.98 (0.93, 1.03)
	Wood Stove Use	0.97 (0.91, 1.04)	1.01 (0.98, 1.03)	1.00 (0.97, 1.02)	1.00 (0.99, 1.02)

<table>
<tr><th>Bibliographic reference</th><th colspan="4">Triche E W, Belanger K, Bracken M B, Beckett W S, Holford T R, Gent J F, McSharry J E, and Leaderer B P (2005) Indoor heating sources and respiratory symptoms in non-smoking women. Epidemiology 16(3), 377-384</th></tr>
<tr><td rowspan="6"></td><td></td><td colspan="3">Upper respiratory symptoms</td></tr>
<tr><td></td><td>Cough</td><td>Runny/stuffy nose</td><td>Sore throat</td></tr>
<tr><td>Fire place use</td><td>1.05 (1.01, 1.09)</td><td>0.99 (0.95, 1.04)</td><td>1.04 (1.00, 1.08)</td></tr>
<tr><td>Gas space heater use</td><td>1.00 (0.97, 1.04)</td><td>0.99 (0.95, 1.03)</td><td>0.99 (0.95, 1.04)</td></tr>
<tr><td>Kerosene Heater Use</td><td>1.01 (0.99, 1.03)</td><td>1.01 (0.99, 1.03)</td><td>1.00 (0.97, 1.02)</td></tr>
<tr><td>Wood Stove Use</td><td>1.01 (0.99, 1.02)</td><td>1.01 (0.99, 1.02)</td><td>1.00 (0.99, 1.02)</td></tr>
<tr><td>Follow up</td><td colspan="4">12 months</td></tr>
<tr><td>Risk of bias (Newcastle-Ottawa Scale)</td><td colspan="4">Selection
Representativeness of the exposed cohort
• truly representative of the average mother in the community
Selection of the non-exposed cohort
• drawn from the same community as the exposed cohort
Ascertainment of exposure
• Objective sampling
Demonstration that outcome of interest was not present at start of study
• Yes
Comparability
Comparability of cohorts on the basis of the design or analysis
• study controls for gas stove use
• study controls for other additional factors as follows - number of children in household, multifamily dwelling, history of allergies, education, race, state of residence
Outcome
Assessment of outcome
• self-report
Was follow-up long enough for outcomes to occur
• Yes
Adequacy of follow up of cohorts
• subjects lost to follow up unlikely to introduce bias - description provided of those lost)
Overall level of bias – Low</td></tr>
<tr><td>Source of funding</td><td colspan="4">Government: National Institute of Environmental Health Sciences</td></tr>
<tr><td>Comments</td><td colspan="4"></td></tr>
</table>

D.1.112 Virtanen 2014

Bibliographic reference	Virtanen SM, Takkinen HM, Nwaru BI, et al (2014) Microbial exposure in infancy and subsequent appearance of type 1 diabetes mellitus-associated autoantibodies: a cohort study. JAMA paediatrics 168(8), 755-63
Study design	Prospective cohort study

Bibliographic reference	**Virtanen SM, Takkinen HM, Nwaru BI, et al (2014) Microbial exposure in infancy and subsequent appearance of type 1 diabetes mellitus-associated autoantibodies: a cohort study. JAMA paediatrics 168(8), 755-63**	
Objective	To investigate whether contacts with animals or other microbial exposures during infancy are associated with the development of clinical or preclinical type 1 diabetes	
Setting/Study location	Finland	
Number of participants	3143 children	
Selected population	No	
Participant characteristics	Description	
	Sex	
	Male	2646 (52.4%)
	Female	1497 (47.6%)
	Age (years) – Maternal	
	< 25	355 (14.8%)
	25 – 29	1099 (35.0%)
	30 – 34	973 (31.0%)
	≥ 35	605 (19.2%)
	Ethnicity	Not reported
	Education	
	SES (Maternal professional level)	
	None	157 (5.1%)
	Professional education/course	808 (26.2%)
	Secondary professional education	1434 (46.4%)
	University	690(22.3%)
	Missing	54
	Building characteristics	Not reported
Inclusion criteria	Infants with increased genetic susceptibility to HLA antigen-DQB1 type 1 diabetes	
Exclusion criteria	Not reported	
Type of pollutant/exposure	Indoor pets	
Pollutant/exposure assessment	Questionnaire	
Outcome	Clinical or pre-clinical Type 1 diabetes	
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between pets indoor and repeated wheeze	
		Clinical Type 1 diabetes
		aOR (95%CI)
	Indoor dog	0.40 (0.14, 1.14)
	Indoor cat	1.34 (0.58, 3.10)
Follow up		

Bibliographic reference	**Virtanen SM, Takkinen HM, Nwaru BI, et al (2014) Microbial exposure in infancy and subsequent appearance of type 1 diabetes mellitus-associated autoantibodies: a cohort study. JAMA paediatrics 168(8), 755-63**
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average infant in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • questionnaire Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for genetic risk • study controls for any additional factor - sex, genetic risk according to HLA-family history of diabetes mellitus mode of delivery place of birth , parental asthma or allergic rhinitis, maternal professional educational level, maternal age, home municipality urbanization level, and the presence of asthma and atopic eczema in the child by the age of 5 year Outcome Assessment of outcome • clinical diagnosis Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias: Moderate** (concern over self-report of exposure)
Source of funding	**Government:** Academy of Finland, Centre of Excellence in Molecular Systems Immunology and Physiology Research 2012-17); the Prevaller Consortium; EU Biomed 2 Program **Charity:** the European Foundation for the Study of Diabetes (EFSD/Novo Nordisk Partnership and ESFD/Juvenile Diabetes Research Foundation/Novo Nordisk Programme); the Foundation for Pediatric Research; the Tampere Tuberculosis Foundation; the Juho Vainio Foundation; the Yrjö Jahnsson Foundation; Medical Research Funds, the Juvenile Diabetes Research Foundation; Novo Nordisk Foundation; **Academic:**Competitive Research Funding of the Tampere University Hospital Turku University Hospital and Oulu University Hospital;
Comments	

D.1.113 Weinmann 2017

Bibliographic reference	**Weinmann T, Gerlich J, Heinrich S et.al (2017) Association of household cleaning agents and disinfectants with asthma in young German adults. Occup Environ Med 2017; 74:684–690.**
Study design	Prospective cohort study

Bibliographic reference	**Weinmann T, Gerlich J, Heinrich S et.al (2017) Association of household cleaning agents and disinfectants with asthma in young German adults. Occup Environ Med 2017; 74:684–690.**		
Objective	To investigate the potential association of the private use of household cleaning sprays and disinfectants with asthma incidence in young adults in the transition from school to working life.		
Setting/Study location	Germany		
Number of participants	1695 young adults		
Selected population	Unclear		
Participant characteristics	Description		
	Sex		
	Female	938 (55.6%)	
	Age (years) Mean (SD)	21.8 (0.75)	
	Ethnicity	Not reported	
	Education	Not reported	
	SES		
	High	1103 (65.1%)	
	Building characteristics	Not reported	
Inclusion criteria	Not reported		
Exclusion criteria	Not reported		
Type of pollutant/exposure	Domestic use of cleaning: Spray use Disinfectant use		
Pollutant/exposure assessment	Questionnaire		
Outcome	Doctor diagnosis of asthma and either wheezing without cold or use of asthma medication within the last 12 months		
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between spray/disinfectant use and incident asthma versus never asthma, persistent asthma versus never asthma		
		Incident asthma	Persistent asthma
	Household spray use	aOR (95%CI)	aOR (95%CI)
	Low use	0.70 (0.23, 2.06)	0.66 (0.34,1.28)
	Medium use	0.78 (0.26, 2.36)	0.65 (0.32, 1.29)
	High use	2.79 (0.84, 9.20)	0.55 (0.18, 1.63)
	Disinfectant use	aOR (95%CI)	aOR (95%CI)
	Low/medium use	1.55 (0.51, 4.71)	1.79 (0.82, 3.91)
	High use	(2.79 1.14, 6.83)	1.70 (0.79, 3.65)
		Incident wheezing	Persistent wheezing
	Household spray use	a OR (95%CI)	aOR (95%CI)
	Low use	1.53 (0.88, 2.65)	1.02 (0.65,1.61)
	medium use	1.34 (0.75, 2.39)	0.97 (0.60, 1.57)

Bibliographic reference	**Weinmann T, Gerlich J, Heinrich S et.al (2017) Association of household cleaning agents and disinfectants with asthma in young German adults. Occup Environ Med 2017; 74:684–690.**		
	High use	1.71 (0.80, 3.67)	1.24 (0.65, 2.39)
	Disinfectant use	aOR (95%CI)	aOR (95%CI)
	Low/ medium use	1.08 (0.60, 1.98)	1.22 (0.74, 2.01)
	High use	0.79 (0.40, 1.56)	0.98 (0.56, 1.70)
Follow up	12 months		
	Selection Representativeness of the exposed cohort • somewhat representative of the average adolescent in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • questionnaire Demonstration that outcome of interest was not present at start of study • No Comparability Comparability of cohorts on the basis of the design or analysis • study controls for smoking • study controls for any additional factor age, sex, socioeconomic status and study centre. Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias: High** (concerns over self-report of exposure and outcomes)		
Source of funding	Not reported		
Comments			

D.1.114 Weinmayr 2015

Bibliographic reference	**Weinmayr G, Hennig F, Fuks K et.al (2015) Long-term exposure to fine particulate matter and incidence of type 2 diabetes mellitus in a cohort study: effects of total and traffic-specific air pollution. Environmental health : a global access science source 14, 53**
Study design	Prospective cohort study
Objective	
Setting/Study location	Germany

Bibliographic reference	**Weinmayr G, Hennig F, Fuks K et.al (2015) Long-term exposure to fine particulate matter and incidence of type 2 diabetes mellitus in a cohort study: effects of total and traffic-specific air pollution. Environmental health : a global access science source 14, 53**		
Number of participants	3607 adults (45–75 years)		
Participant characteristics	Description	No. (%)	No. (%)
	Sex (male)	1540 (47)	185 (56)
	Age (years); mean (SD)	58.8 (7.6)	60.5 (7.5)
	Ethnicity	Not reported	Not reported
	Cases/selected population	Not selected	Not selected
	Socio-economic status (education)		
	Highest: ≥18 years	426 (13)	20 (6)
	High: 14–17	753 (23)	70 (21)
	Middle 11–13 years	1801 (55)	209 (63)
	Low: ≤10 years	327 (10)	33 (10)
	Building characteristics (dampness and mould)	Not reported	Not reported
Inclusion criteria	Not reported		
Exclusion criteria	Not reported		
Type of pollutant/exposure	Particulate matter (PM) and road proximity		
Pollutant/exposure assessment	PM_{10} and $PM_{2.5}$ concentrations were estimated with the European Air Pollution Dispersion and Chemistry Transport Model (EURAD-CTM) on a spatial resolution of 1 km2 grid cells. As additional traffic exposure we used the distance to the next road with a traffic density higher than the 80 %-percentile (26062 vehicles/day) in the study region		
Outcome	Diabetes incidence		
Results	Adjusted odds ratios (aRRs) and 95% confidence intervals (CIs) for association between distance to major road, PM and diabetes incidence (aRRs are presented for an increase of 1 μg/m^3).		
		Diabetes incidence	
		aRR (95%CI)	
	PM_{10}	1.05 (1.00, 1.10)	
	$PM_{2.5}$	1.03 (0.95, 1.12)	
	Distance to major road (>200 m reference)		
	≤ 100	1.37 (1.04, 1.81)	
	>100-200	0.77 (0.57, 1.04)	
Follow up	Mean follow-up time 5.1 years		
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average population in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort		

Bibliographic reference	**Weinmayr G, Hennig F, Fuks K et.al (2015) Long-term exposure to fine particulate matter and incidence of type 2 diabetes mellitus in a cohort study: effects of total and traffic-specific air pollution. Environmental health : a global access science source 14, 53**
	Ascertainment of exposure • validated measurement used Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for age, gender, lifestyle variables, BMI, individual and neighbourhood SES Outcome Assessment of outcome • self-reported physician diagnosis or incident intake of an anti-diabetic drug during follow-up Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • subjects lost to follow up unlikely to introduce bias **Overall risk of bias: low**
Source of funding	**Government:** German Ministry of Education and Science and from the German Research Council **Charity:** Heinz Nixdorf Foundation
Comments	

D.1.115 Wesselink 2017

Bibliographic reference	**Wesselink A K, Carwile J L, Fabian M P et.al (2017) Residential Proximity to Roadways and Ischemic Placental Disease in a Cape Cod Family Health Study. Int. J. Environ. Res. Public Health 2017, 14, 682**		
Study design	Retrospective cohort study		
Objective	To examine the association between exposure to traffic-related air pollution and the risk of ischemic placental disease and other obstetric conditions with a placental aetiology.		
Setting/Study location	United states		
Number of participants	3309 pregnant women		
Participant characteristics		Ischemic Placental Disease	
		Yes (n =270)	No (n=3039)
	Description	No. (%)	No. (%)
	Sex (male)		
	Age (maternal; years); mean (SD)	26.6 (4.5)	27.7 (4.6)
	Ethnicity		
	White	256 (94.8)	2956 (97.3)

<table>
<tr><th>Bibliographic reference</th><th colspan="5">Wesselink A K, Carwile J L, Fabian M P et.al (2017) Residential Proximity to Roadways and Ischemic Placental Disease in a Cape Cod Family Health Study. Int. J. Environ. Res. Public Health 2017, 14, 682</th></tr>
<tr><td></td><td>Cases/selected population</td><td colspan="2">Not reported</td><td colspan="2">Not reported</td></tr>
<tr><td></td><td colspan="5">Socio-economic status (maternal education)</td></tr>
<tr><td></td><td>Less than high school</td><td colspan="2">2 (0.7)</td><td colspan="2">39 (1.3)</td></tr>
<tr><td></td><td>High school graduate</td><td colspan="2">55 (20.4)</td><td colspan="2">569 (18.7)</td></tr>
<tr><td></td><td>Some college</td><td colspan="2">105 (38.9)</td><td colspan="2">1047 (34.5)</td></tr>
<tr><td></td><td>Four-year college graduate or more</td><td colspan="2">108 (40.0)</td><td colspan="2">1384 (45.5)</td></tr>
<tr><td></td><td>Building characteristics</td><td colspan="2">Not reported</td><td colspan="2">Not reported</td></tr>
<tr><td>Inclusion criteria</td><td colspan="5">Not reported</td></tr>
<tr><td>Exclusion criteria</td><td colspan="5">Pregnancies with an unknown outcome
Ectopic pregnancies
Elective abortions
Pregnancy losses at <27 weeks' gestation
Multiple births
Foetuses with major birth anomalies
Pregnancies with an unknown date of the last menstrual period
Pregnancies at addresses that could not be geocoded
Pregnancies with an incalculable perchloroethylene (PCE) exposure</td></tr>
<tr><td>Type of pollutant/exposure</td><td colspan="5">Traffic related air pollution</td></tr>
<tr><td>Pollutant/exposure assessment</td><td colspan="5">Road data were obtained from Topologically Integrated Geographic Encoding and Referencing System (TIGER) files for Barnstable County (which includes Cape Cod) from the 1990 U.S. census website for each of the eight study towns. Major roadways, defined as A1 (primary highways with limited access including roads like interstate highways), A2 (primary roads without limited access like state and local highways that connect cities and towns), and A3 (smaller secondary roads that may connect smaller towns) road segments.
Authors used ArcGIS to calculate two metrics of traffic exposure: (a) the shortest Euclidean distance between each residence and the closest major roadway and (b) the length of major roadways within 200 and 500 m buffers around each residence</td></tr>
<tr><td>Outcome</td><td colspan="5">Preeclampsia, placental abruption, small for gestational age (SGA) and stillbirth</td></tr>
<tr><td>Results</td><td colspan="5">Adjusted odds ratios (aRRs) and 95% confidence intervals (CIs) for association between traffic exposure and preeclampsia, placental abruption, small for gestational age (SGA) and stillbirth</td></tr>
<tr><td></td><td></td><td>Preeclampsia</td><td>Placental Abruption</td><td>SGA</td><td>Stillbirth</td></tr>
<tr><td></td><td></td><td>RR (95%CI)</td><td>RR (95%CI)</td><td>RR (95%CI)</td><td>RR (95%CI)</td></tr>
<tr><td></td><td colspan="5">Distance from closest A1–A3 road (m)</td></tr>
<tr><td></td><td>≥ 200</td><td>Reference</td><td>Reference</td><td>Reference</td><td>Reference</td></tr>
<tr><td></td><td>100–199</td><td>0.89 (0.37, 2.17)</td><td>1.34 (0.54, 3.30)</td><td>0.81 (0.55, 1.19)</td><td>2.02 (0.65, 6.30)</td></tr>
</table>

Bibliographic reference	Wesselink A K, Carwile J L, Fabian M P et.al (2017) Residential Proximity to Roadways and Ischemic Placental Disease in a Cape Cod Family Health Study. Int. J. Environ. Res. Public Health 2017, 14, 682				
	<100	0.46 (0.16, 1.29)	1.75 (0.82, 3.76)	0.91 (0.63, 1.31)	1.71 (0.56, 5.23)
Follow up	Not reported				
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average population in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • validated measurement used questionnaire/ self-report Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for maternal age at pregnancy and year of pregnancy Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • not reported Adequacy of follow up of cohorts • subjects lost to follow up unlikely to introduce bias **Overall risk of bias: moderate:** possibility of response bias from outcome assessment)				
Source of funding	**Government:** National Institute of Environmental Health, National Institute of Child Health and Human Development				
Comments					

D.1.116 White 2017

Bibliographic reference	White AJ, and Sandler DP (2017) Indoor Wood-Burning Stove and Fireplace Use and Breast Cancer in a Prospective Cohort Study. Environmental Health Perspectives 125, 1-7
Study design	Prospective cohort study
Objective	To evaluate the risk of breast cancer in relation to indoor heating and cooking practices.
Setting/Study location	United States and Puerto Rico
Number of participants	50,884 women at risk of breast cancer

Bibliographic reference	**White AJ, and Sandler DP (2017) Indoor Wood-Burning Stove and Fireplace Use and Breast Cancer in a Prospective Cohort Study. Environmental Health Perspectives 125, 1-7**		
Selected population	No		
Participant characteristics	Description Sex Age (years) Mean *SD) at baseline Ethnicity Non-Hispanic white Education Less than high school degree High school degree or equivalent Some college, no degree Associate degree 4-y degree Master's degree Doctoral degree SES (reported as income) <20,000USD 20,000–49,999USD 50,000–99,999USD 100,000–199,999USD ≥200,000 USD Building characteristics	No indoor wood-burning stove/fireplace 18; 017 (100%) 54.6 (9.2) 13,543(75.2%) 412 (2.3%) 3,136 (17.4%) 3,949 (21.9%) 2,827 (15.7%) 4,248 (23.6%) 2,884 (16.0%) 558 (3.1%) 1,443 (8.3%) 5,060 (29.0%) 7,299 (41.8%) 3,112 (17.8%) 535 (3.1%) Not reported	Indoor wood-burning stove/fireplace 29; 495 (100%) 55.7 (8.7) 26,274(89.1%) 167 (0.6%) 3,440 (11.7%) 5,308 (18.0%) 3,903 (13.2%) 8,667 (29.4%) 6,592 (22.4%) 1,414 (4.8%) 666 (2.4%) 4,372 (15.5%) 11,343 (40.2%) 9,031 (32.0%) 2,833 (10.0%) Not reported
Inclusion criteria	No personal history of breast cancer, Living in the United States or Puerto Rico Being between 35–74 y of age Having a sister who had been previously diagnosed with breast cancer		
Exclusion criteria	Not reported		
Type of pollutant/exposure	Wood burning stove/fireplace Gas stove/fireplace		
Pollutant/exposure assessment	Questionnaire		
Outcome	Breast cancer		
Results	Adjusted hazard ratios (aHRs) and 95% confidence intervals (CIs) for association between Indoor heating/cooking at longest adult residence and breast cancer		
		Breast cancer	
		aHR (95%CI)	
	Indoor wood burning stove/fireplace	1.11 (1.01,1.22)	
	Indoor wood-burning stove/fireplace fuel		
	Fuel - Wood	1.09 (0.98,1.21)	
	Fuel -- gas	1.15 (1.00,1.32)*	
	Fuel – artificial logs	0.98 (0.85,1.12)	

Bibliographic reference	**White AJ, and Sandler DP (2017) Indoor Wood-Burning Stove and Fireplace Use and Breast Cancer in a Prospective Cohort Study. Environmental Health Perspectives 125, 1-7**	
	Main source of heating	
	Gas	1.09 (0.98,1.21)
	Fuel oil	1.13 (0.97,1.32)
	Propane	0.83 (0.64,1.07)
	Wood	1.09 (0.82,1.45)
	Other	0.90 (0.63,1.27)
Follow up	Mean 64 years	
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average woman in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • written self-report Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for hormone replacement therapy use at enrolment • study controls for any additional factors – race, education, marital status, annual household income, parity, use of oral contraceptives,), age at menopause and BMI Outcome Assessment of outcome • record linkage Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias: Low**	
Source of funding	**Government:** National Institute of Environmental Health Sciences	
Comments		

D.1.117 Willers 2006

Bibliographic reference	**Willers S M, Brunekreef B, Oldenwening M et.al (2006) Gas cooking, kitchen ventilation, and asthma, allergic symptoms and sensitization in young children--the PIAMA study. Allergy 61(5), 563-8**
Study design	Prospective cohort study

Bibliographic reference	**Willers S M, Brunekreef B, Oldenwening M et.al (2006) Gas cooking, kitchen ventilation, and asthma, allergic symptoms and sensitization in young children--the PIAMA study. Allergy 61(5), 563-8**		
Objective	To investigate the effect of kitchen ventilation (while cooking) on the relationship between gas cooking, combustion product dispersal, and respiratory and allergic outcomes in children		
Setting/Study location	The Netherlands		
Number of participants	3148 children		
Selected population	Yes – children selected as high risk due to maternal atopy and a random sample of ‘low risk’		
Participant characteristics	Description	No.	%
	Sex	Not reported	Not reported
	Maternal age (years)	Not reported	Not reported
	Ethnicity	Not reported	Not reported
	(Maintenance) medication use	Not reported	Not reported
	Maternal asthma and/or atopic	Not reported	Not reported
	Parental education	Not reported	Not reported
	Annual family income	Not reported	Not reported
	Building characteristics	Not reported	Not reported
Inclusion criteria	Not reported		
Exclusion criteria	Not reported		
Type of pollutant/exposure	NO_2 from gas cooking		
Pollutant/exposure assessment	Questionnaire containing questions about cooking and ventilation habits to evaluate the relationships between indoor air pollution, asthma and allergic diseases.		
Outcome	Asthma Wheeze Nasal symptoms Eczema		
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between gas cooking and respiratory and atopic outcomes		
		Gas cooking OR (95%CI)	
	Eczema	0.97 (0.74, 1.26)	
	Asthma	1.50 (0.90, 2.49)	
	Nasal symptoms	1.34 (1.06, 1.71)	
	Wheezing	0.99 (0.74, 1.32)	
Follow up	12 months		
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort truly representative of the average child in the community Selection of the non-exposed cohort		

Bibliographic reference	**Willers S M, Brunekreef B, Oldenwening M et.al (2006) Gas cooking, kitchen ventilation, and asthma, allergic symptoms and sensitization in young children--the PIAMA study. Allergy 61(5), 563-8**
	• drawn from the same community as the exposed cohort Ascertainment of exposure • self-report Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for smoker in the home • study controls for other factors as follows - Gender, dampness in the home, allergy or asthma in the parents , presence of older siblings, pets, pregnancy duration, education level of the mother and breast feeding Outcome Assessment of outcome • independent blind assessment Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall level of bias – Moderate** (concerns over self-report of exposure)
Source of funding	**Industry:** Study supported by a grant from Gasuine Trade & supply
Comments	The chance of accumulation of combustion products (CACP) was used besides the distinction between using gas or electricity for cooking and aimed at reducing the misclassification of exposure. Authors suggest that study provides only limited evidence that combustion from gas cooking are associated with increased reporting of respiratory and allergic symptoms in young children.

D.1.118 Zhang 2016

Bibliographic reference	**Zhang Z, Laden F, Forman J P et.al (2016) Long-Term Exposure to Particulate Matter and Self-Reported Hypertension: A Prospective Analysis in the Nurses' Health Study. Environmental health perspectives 124(9), 1414-20**		
Study design	Prospective cohort study		
Objective	To examine the association of hypertension incidence with long-term residential exposures to ambient particulate matter (PM) and residential distance to roadway		
Setting/Study location	United States		
Number of participants	121,700 adult females		
Selected population	No		
Participant characteristics	Description	No.	%
	Sex	All female	All female

Bibliographic reference	**Zhang Z, Laden F, Forman J P et.al (2016) Long-Term Exposure to Particulate Matter and Self-Reported Hypertension: A Prospective Analysis in the Nurses' Health Study. Environmental health perspectives 124(9), 1414-20**		
	Age (years); mean (SD)	60.39 (8.62)	-
	Ethnicity		
	White	71136	95
	Black	749	1
	Asian	749	1
	Other	2995	4
	Cases/selected population	Not reported	Not reported
	Socio-economic status (husband's education)		
	Less than high school	2995	4
	High school	20966	28
	More than high school	31450	42
	Building characteristics	Not reported	Not reported
Inclusion criteria	Not reported		
Exclusion criteria	Not reported		
Type of pollutant/exposure	Proximity to traffic and exposures to PM_{10}, $PM_{2.5}$, and $PM_{2.5}$ –10.		
Pollutant/exposure assessment	Geographic information system (GIS)-based spatio-temporal models were used to predict monthly exposures to PM_{10} and $PM_{2.5}$ for each participant. Authors calculated distance to roads (in meters) for each residential address using GIS (ArcGIS, version 9.2; ESRI). A1 (primary roads, typically interstate highways, with limited access, division between the opposing directions of traffic, and defined exits), A2 (primary major, non-interstate highways and major roads without access restrictions), or A3 (smaller, secondary roads, usually with more than two lanes).		
Outcome	Incident hypertension		
Results	Adjusted hazard ratios (aHRs) and 95% confidence intervals (CIs) for association between hypertension and each 10-µg/m^3 increase in particulate matter exposures		
		Incident hypertension	
		aHR (95%CI)	
	PM_{10}	1.02 (1.00, 1.04)	
	$PM_{2.5}$ -10	1.03 (1.00, 1.06)	
	$PM_{2.5}$	1.01 (0.98, 1.05)	
	Adjusted hazard ratios (aHRs) and 95% confidence intervals (CIs) for association between hypertension and roadway proximity		
	Distance (metres)	Incident hypertension	
	≥ 200	1.00 (Referent)	
	100–199	0.96 (0.88, 1.05)	
	0–99	1.01 (0.88, 1.15)	
Follow up	24 months		

Bibliographic reference	**Zhang Z, Laden F, Forman J P et.al (2016) Long-Term Exposure to Particulate Matter and Self-Reported Hypertension: A Prospective Analysis in the Nurses' Health Study. Environmental health perspectives 124(9), 1414-20**
Study methods	Participants were considered to have hypertension if they reported hypertension on the questionnaire ("physician diagnosis of high blood pressure"). In a validation study (n=100) using medical records to confirm systolic or diastolic BP > 140 or > 90 mmHg, respectively, agreement between the medical record and self-report was nearly 100%. Time-varying Cox proportional hazards models were used to model the relationship of incidence of hypertension to roadway proximity and predicted $PM_{2.5}$, PM_{10}, and $PM_{2.5}$ –10 exposure measures adjusting for possible confounders.
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average population in the community Selection of the non-exposed cohort • no description of the derivation of the non-exposed cohort Ascertainment of exposure • validated measurement used Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for age, race, body mass index (BMI), Dietary, Approaches to Stop Hypertension (DASH) diet score, alcohol consumption, smoking status, physical activity, family history of hypertension, menopausal status, nonnarcotic analgesic intake, statin use, diabetes, individual-level socioeconomic status Outcome Assessment of outcome • record linkage • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • subjects lost to follow up unlikely to introduce bias **Overall risk of bias: low**
Source of funding	**Government:** National Institutes of Health **Professional:** the American Heart Association **Academic:** China Scholarship Council (CSC), and the Zhejiang University Research Centre for Air Pollution and Health.
Comments	

D.1.119 1 Zhou 2013

Bibliographic reference	**Zhou C, Baiz N, Zhang T, et al (2013) Modifiable exposures to air pollutants related to asthma phenotypes in the first year of life in children of the EDEN mother-child cohort study. BMC public health 13, 506**		
Study design	Prospective cohort study		
Objective	To study the impacts of the in utero and first year of life exposures of asthma phenotypes in the first year of life.		
Setting/Study location	France		
Number of participants	1,765 mother-child pairs		
Selected population	No		
Participant characteristics	Description Sex Male Female Age (years)- Maternal – Mean (SD) Ethnicity Education (Maternal) Less than high school High school College/University or more Annual family income (Euro) Low(≤1500) Middle(1501–3000) High(>3001)	 918 647 30.64 (4.81) Not reported 104(5.89) 683(38.70) 950(53.82) 262(14.84) 1001(56.71) 492(27.88)	
Inclusion criteria	Not reported		
Exclusion criteria	Not reported		
Type of pollutant/exposure	Proximity to traffic Dampness Heating Pets		
Pollutant/exposure assessment	Questionnaire		
Outcome	Asthma, Wheeze Bronchiolitis		
Results	Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for association between proximity to traffic and respiratory conditions		

		Asthma	Wheezing	Bronchiolitis
		aOR (95%CI)	aOR (95%CI)	aOR (95%CI)
	Traffic-related air pollution	1.71 (1.08, 2.72)	1.47 (1.09,1.97)	1.18 (0.90,1.55)
	Dampness	2.19 (1.06, 4.53)	2.12 (1.30, 3.46)	1.32 (0.80, 2.18)

Bibliographic reference	**Zhou C, Baiz N, Zhang T, et al (2013) Modifiable exposures to air pollutants related to asthma phenotypes in the first year of life in children of the EDEN mother-child cohort study. BMC public health 13, 506**			
Study design	Prospective cohort study			
	Contact with cats	0.27 (0.08, 0.86)	0.94 (0.61,1.46)	0.69 (0.47,1.03)
	Domestic wood heating	0.97(0.37,2.50)	0.53 (0.27,1.03)	0.63 (0.38,1.06)
Follow up				
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average child in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • structured interview Demonstration that outcome of interest was not present at start of study • Yes Comparability Comparability of cohorts on the basis of the design or analysis • study controls for family history • study controls for additional factors including age, gender, family income, maternal age and maternal education Outcome Assessment of outcome • Doctor diagnosed Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall level of bias – Low**			
Source of funding	**Government:** Fondation pour la Recherche médicale (FRM); French Ministry of Research: INSERM Nutrition Research Program; French Ministry of Health Perinatality, French Agency for Environmental Security(AFFSET); French National Insitute for Population Health Surveillance (INVS); Paris-sud Unversity; French National Institute for Health Education (INPES); Nestlé, Mutuelle Générale de l'Education Nationale (MGEN); French Speaking Association for the Study of Diabetes and Metabolism (ALFEDIAM); National Agency for Research (ANR) and the fellowship of Erasmus Mundus External Cooperation Window (EM ECW) for China,			
Comments				

D.1.120 Zock 2007

Bibliographic reference	**Zock JP, Plana E, Jarvis D, et al (2007) The use of household cleaning sprays and adult asthma: an international longitudinal study. American journal of respiratory and critical care medicine 176(8), 735-41**
Study design	Prospective cohort study
Objective	To investigate the risk of new-onset asthma in relation to the use of common household cleaners
Setting/Study location	10 European countries
Number of participants	3503 adults
Selected population	No
Participant characteristics	(see below)

Participant characteristics		
	Description	
	Sex	
	Female	951 (27.1%)
	Age (years) Mean (range)	42.6 (28 to57)
	Ethnicity	Not reported
	Education	Not reported
	SES	Not reported
	Building characteristics	Not reported

Inclusion criteria	Not reported
Exclusion criteria	People with asthma (those who had reported a history of asthma and/or having had nocturnal attacks of shortness of breath in the last 12 months, and/or wheeze when not having a cold in the last 12 months)
Type of pollutant/exposure	Household cleaning sprays
Pollutant/exposure assessment	Questionnaire
Outcome	Physician-diagnosed asthma and wheeze
Results	Adjusted risk ratios (aRRs), hazard ratios (aHRs) and 95% confidence intervals (CIs) for association between the use of cleaning products at least weekly and the incidence of asthma

Results		Asthma attack and/or nocturnal shortness of breath	Current Wheeze	Physician-diagnosed asthma
		aRR (95%CI)	aRR (95%CI)	aHR (95%CI)
	Any spray	1.49 (1.12, 1.99)	1.39 (1.06, 1.80)	1.28 (0.78, 2.09)
	Any perfumed or scented product	1.09 (0.78, 1.50)	1.11 (0.83, 1.49)	1.29 (0.74, 2.26)
	Frequency of use			
	Use of spray(s) 1 to 3 d/wk	1.36 (0.99,1.89)	1.55 (1.17, 2.06)	0.93 (0.51, 1.67)
	Use of spray(s) 4 to 7 d/wk	1.75 (1.21,2.54)	1.08 (0.73,1.59)	2.11 (1.15, 3.89)
	One type of spray used > 1 d/wk	1.37 (0.99, 1.90)	1.25 (0.92, 1.69)	0.97 (0.53, 1.77)

Bibliographic reference	**Zock JP, Plana E, Jarvis D, et al (2007) The use of household cleaning sprays and adult asthma: an international longitudinal study. American journal of respiratory and critical care medicine 176(8), 735-41**			
	Two types of spray used > 1 d/wk	1.45 (0.92, 2.27)	1.63 (1.10, 2.41)	1.47 (0.70, 3.06)
	Three or more types of spray used > 1 d/wk	2.40 (1.47, 3.91)	1.80 (1.11, 2.94)	2.96 (1.33, 6.56)
	Individual products			
	Washing powders	1.10 (0.75, 1.63)	1.28 (0.91, 1.81)	0.82 (0.43, 1.54)
	Liquid multiuse cleaning products	0.94 (0.64,1.38)	0.97 (0.70, 1.35)	0.98 (0.52, 1.86)
	Polishes, waxes	1.12 (0.71,1.76)	1.19 (0.77, 1.85)	1.42 (0.68, 2.97)
	Bleach	1.22 (0.83, 1.80)	1.30 (0.90, 1.87)	1.10 (0.56, 2.17)
	Ammonia	1.40 (0.87,2.23)	1.31 (0.81, 2.13)	0.92 (0.33, 2.59)
	Decalcifiers, acids	1.06 (0.70, 1.61)	1.18 (0.77, 1.80)	0.25 (0.06, 1.04)
	Solvents, stain removers	1.54 (0.94, 2.53)	2.00 (1.30, 3.07)	0.48 (0.12, 1.97)
	Furniture sprays	1.49 (0.99, 2.23)	1.46 (0.98, 2.19)	2.46 (1.26, 4.80)
	Glass-cleaning sprays	1.35 (0.98,1.85)	1.49 (1.12, 2.00)	1.43 (0.84, 2.44)
	Sprays for carpets, rugs, curtains	1.24 (0.47, 3.21)	0.80 (0.26, 2.41)	0.80 (0.11, 5.93)
	Sprays for mopping the floor	1.05 (0.59, 1.85)	1.03 (0.59,1.79)	0.93 (0.30, 2.85)
	Oven sprays	0.87 (0.33, 2.28)	1.24 (0.57, 2.69)	0.63 (0.09, 4.64)
	Ironing sprays	1.66 (0.92, 3.00)	1.05 (0.48, 2.30)	1.51 (0.46, 4.96)
	Air-refreshing sprays	1.71 (1.22, 2.39)	1.36 (0.98, 1.88)	1.46 (0.78, 2.70)
Follow up	Mean 8.9 years			
Risk of bias (Newcastle-Ottawa Scale)	Selection Representativeness of the exposed cohort • truly representative of the average adult in the community Selection of the non-exposed cohort • drawn from the same community as the exposed cohort Ascertainment of exposure • questionnaire Demonstration that outcome of interest was not present at start of study • Yes Comparability			

Bibliographic reference	Zock JP, Plana E, Jarvis D, et al (2007) The use of household cleaning sprays and adult asthma: an international longitudinal study. American journal of respiratory and critical care medicine 176(8), 735-41
	Comparability of cohorts on the basis of the design or analysis • study controls for smoking status • study controls for any additional factor sex, age, cleaning job, and study center Outcome Assessment of outcome • self-report Was follow-up long enough for outcomes to occur • Yes Adequacy of follow up of cohorts • complete follow up - all subjects accounted for **Overall risk of bias: High** r(Concerns over self-report of exposure and outcomes)
Source of funding	**Government:** Albacete: Fondo de Investigaciones Santarias (FIS) Hospital Universitario de Albacete, Consejeria de Sanidad; Antwerp: FWO (Fund for Scientific Research)–Flanders Belgium University of Antwerp, Flemish Health Ministry; Barcelona:SEPAR, Public Health Service CIRIT, Red Respira ISCII; Basel: Swiss National Science Foundation, Swiss Federal Office for Education and Science, Swiss National Accident Insurance Fund (SUVA), USC NIEHS; Bergen: Norwegian Research Council, Norwegian Asthma and Allergy Association (NAAF), Glaxo Wellcome AS, Norway Research Fund; Erfurt: GSF–National Research Centre for Environment and Health, Deutsche Forschungsgemeinschaft (DFG); Galdakao: Basque Health Department; Goteborg: Swedish Heart Lung Foundation, Swedish Foundation for Health Care Sciences and Allergy Research, Swedish Asthma and Allergy Foundation, Swedish Cancer and Allergy Foundation; Grenoble: Program Hospitalier de Recherche Clinique–DRC de Grenoble 2000 no. 2610, Ministry of Health, Direction de la Recherche Clinique, Ministere de l'Emploi et de la Solidarite, Direction Generale de la Sante, CHU de Grenoble, Comite des Maladies Respiratoires de l'Isere; Hamburg: GSF–National Research Centre for Environment and Health, DFG; Ipswich and Norwich: Asthma UK (formerly known as National Asthma Campaign); Huelva: FIS Oviedo: FIS); Paris: Ministere de l'Emploi et de la Solidarite, Direction Generale de la Sante, UCB-Pharma (France), Aventis (France), Glaxo France, Program Hospitalier de Recherche Clinique–DRC de Grenoble 2000 no. 2610, Ministry of Health, Direction de la Recherche Clinique, CHU de Grenoble; Pavia: GlaxoSmithKline Italy, Italian Ministry of University and Scientific and Technological Research (MURST), local university funding for research 1998 and 1999 (Pavia, Italy); Tartu: Estonian Science Foundation; Turin: ASL 4 Regione Piemonte (Italy), AO CTO/ICORMA Regione Piemonte (Italy), MURST; GlaxoSmithKline Italy; Umea° : Swedish Heart Lung Foundation, Swedish Foundation for Health Care Sciences and Allergy Research, Swedish Asthma and Allergy Foundation, Swedish Cancer and Allergy Foundation; Uppsala: Swedish Heart Lung Foundation, Swedish Foundation for Health Care Sciences and Allergy Research, Swedish Asthma and Allergy Foundation, Swedish Cancer and Allergy Foundation; Verona: University of Verona; MURST; GlaxoSmithKline Italy.
Comments	

Appendix E: Forest plots

No forest plots were created for this review.

Appendix F: GRADE tables

F.1 Association between sources of pollutants and health outcomes

F.1.1 Sources of NO_2 and health outcomes

F.1.1.1 Gas heating

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Cough									
Gas heating - infants with parental history of allergy									
Roda 2013	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	2898	0.78 (0.56, 1.09)	LOW
Gas heating – Infants without parental history of allergy									
Roda 2013	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	2898	1.01 (0.69, 1.46)	LOW
Wheeze									
Gas central heating									
De Bilderling 2005	Prospective cohort	Very serious[e]	NA[b]	Not serious[c]	Serious[d]	None	1868	0.76 (0.47, 1.23)	VERY LOW
Gas fire for heating									
De Bilderling 2005	Prospective cohort	Very serious[e]	NA[b]	Not serious[c]	Serious[d]	None	1868	0.97 (0.67, 1.39)	VERY LOW
Breast cancer									
Heating fuel=gas – Women at risk of breast cancer									
White 2017	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Not serious[g]	None	50884	aHR 1.15 (1.00,1.32)	HIGH

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Main source of heating=gas – Women at risk of breast cancer									
White 2017	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	None	50884	aHR 1.09 (0.98,1.21)	MODERATE

(a) Serious concerns over self-report of outcomes
(b) Not applicable as only one study included
(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross line of no effect)
(e) Very serious concerns over self-report of outcome and presence of outcome at 7-8 years of age
(f) No concerns over risk of bias
(g) No concerns as findings are statistically significant (95%CIs do not cross line of no effect)

F.1.1.2 Gas space heater

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Cough									
Infants									
Triche 2002	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	890	0.94 (0.75, 1.18)	MODERATE
Mothers of infants									
Triche 2005	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	888	1.00 (0.97, 1.04)	MODERATE
Asthma with wheeze									
McConnell 2002	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	3535	1.20 (0.70, 2.00)	MODERATE
Wheeze									
Infants									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Triche 2002	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	890	1.25 (1.05, 1.50)	HIGH
Mothers of infants									
Triche 2005	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	888	1.03 (0.94, 1.13)	MODERATE
Chest tightness									
Triche 2005	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	888	1.01 (0.96, 1.07)	MODERATE
Laryngitis									
Triche 2005	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	888	0.93 (0.79, 1.10)	MODERATE
Phlegm									
Triche 2005	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	888	0.96 (0.88, 1.05)	MODERATE
Runny / stuffy nose									
Triche 2005	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	888	0.99 (0.95, 1.03)	MODERATE
Sore throat									
Triche 2005	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	888	0.99 (0.95, 1.04)	MODERATE

(a) No concerns over risk of bias
(b) Not applicable as only one study included
(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross line of no effect)
(e) No concerns as findings are statistically significant (95%CIs do not cross line of no effect)

F.1.1.3 Gas for cooking

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Asthma									
Gas stove									
McConnell 2002	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	3535	1.3 (0.80, 2.00)	MODERATE
Casas 2012	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	5078	1.33 (0.88, 2.00)	MODERATE
Wheeze									
Gas for cooking									
de Bilderling 2005	Prospective cohort	Very serious[e]	NA[b]	Not serious[c]	Serious[d]	None	1868	1.02 (0.77, 1.36)	VERY LOW
Casas 2012	Prospective cohort	Very serious[e]	NA[b]	Not serious[c]	Serious[d]	None	5078	1.09 (0.76, 1.57)	VERY LOW
Samet 1993	Prospective cohort	Very serious[e]	NA[b]	Not serious[c]	Serious[d]	None	1205	0.84 (0.64, 1.09)	VERY LOW
Gas stove (children whose mother had asthma)									
Belanger 2003	Prospective cohort	Serious[f]	NA[b]	Not serious[c]	Serious[d]	None	849	1.03 (0.59, 1.79)	LOW
Gas stove (children whose mother did not have asthma)									
Belanger 2003	Prospective cohort	Serious[f]	NA[b]	Not serious[c]	Serious[d]	None	849	1.28 (0.88, 1.86)	LOW
Cough									
Gas cooking with hood (daily)									
Mommers 2005	Nested case control	Very serious[e]	NA[b]	Not serious[c]	Serious[d]	None	1191	0.93 (0.64,1.36)	VERY LOW
Gas cooking with hood (regularly)									
Mommers 2005	Nested case control	Very serious[e]	NA[b]	Not serious[c]	Serious[d]	None	1191	1.49 (0.80, 2.78)	VERY LOW

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Gas stove									
Samet 1993	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	1205	0.94 (0.82, 1.07)	MODERATE
Gas stove (children whose mother had asthma)									
Belanger 2003	Prospective cohort	Serious[f]	NA[b]	Not serious[c]	Serious[e]	None	849	0.79 (0.46, 1.36)	LOW
Gas stove (children whose mother did not have asthma)									
Belanger 2003	Prospective cohort	Serious[f]	NA[b]	Not serious[c]	Not serious[g]	None	849	1.52 (1.06, 2.18)	MODERATE
Nasal symptoms									
Gas stove									
Willers 2006	Prospective cohort	Serious[f]	NA[b]	Not serious[c]	Not serious[g]	None	3148	1.34 (1.06, 1.71)	MODERATE
Respiratory illness									
Gas stove									
Samet 1993	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	1205	0.98 (0.90, 1.07)	MODERATE
Gas stove (reported as lower respiratory tract infections)									
Ostro 1993	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[g]	None	321	1.23 (1.03, 1.47)	HIGH
Gas stove (reported as Upper respiratory tract infections)									
Ostro 1993	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	321	1.06 (0.94, 1.18)	MODERATE
Eczema									
Gas stove									
Willers 2006	Prospective	Serious[f]	NA[b]	Not serious[c]	Serious[d]	None	3148	0.97 (0.74, 1.26)	LOW
Shortness of breath									
Gas stove (multi-family housing)									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Belanger 2006	Prospective	Serious[f]	NA[b]	Not serious[c]	Not serious[g]	None	728	2.38 (1.12, 5.06)	MODERATE
Gas stove (single-family housing)									
Belanger 2006	Prospective	Serious[f]	NA[b]	Not serious[c]	Serious[d]	None	728	0.91 (0.50, 1.64)	LOW
Chest tightness									
Gas stove (Multi-family housing)									
Belanger 2006	Prospective cohort	Serious[f]	NA[b]	Not serious[c]	Not serious[g]	None	728	4.34 (1.76, 10.69)	MODERATE
Gas stove (Single-family housing)									
Belanger 2006	Prospective cohort	Serious[f]	NA[b]	Not serious[c]	Serious[d]	None	728	0.68 (0.34, 1.32)	LOW

(a) No concerns over risk of bias
(b) Not applicable as only one study included
(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross line of no effect
(e) Very serious concerns over risk of bias due to concerns over self-report of outcomes and of exposure
(f) Serious concerns over risk of bias due to self-report of outcomes
(g) No concerns as findings are statistically significant (95%CIs do not cross line of no effect)

F.1.1.4 Other gas appliance

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Asthma									
Home Gas appliance									
Ponsonby 2001	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	456	1.30 (0.74, 2.29)	LOW
Cough									
Unvented gas geyser for water heating									
Mommers 2005	Nested case control	Very serious[e]	NA[b]	Not serious[c]	Serious[d]	None	1191	1.74 (0.74, 4.12)	VERY LOW
Vented gas geyser for water heating									
Mommers 2005	Nested case control	Very serious[e]	NA[b]	Not serious[c]	Serious[d]	None	1191	1.28 (0.85, 1.94)	VERY LOW
Shortness of breath									
Gas dryer (multi-family housing)									
Belanger 2006	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	728	2.39 (0.77, 7.43)	LOW
Gas stove (single-family housing)									
Belanger 2006	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	728	0.91 (0.50, 1.64)	LOW
Chest tightness									
Gas dryer (multi-family home)									
Belanger 2006	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	728	1.09 (0.31, 3.90)	LOW
Gas dryer (Single-family housing)									
Belanger 2006	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	728	1.41 (0.61, 3.26)	LOW

(a) Serious concerns over risk of bias due to self-report of outcomes
(b) Not applicable as only one study included

(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)
(e) Very serious concerns over risk of bias due to concerns over self-report of outcomes and of exposure

F.1.2 Sources of PM and health outcomes

F.1.2.1 Fireplace

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Cough									
Fireplace for heating - Infants									
Triche 2002	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	890	0.99 (0.81, 1.21)	MODERATE
Fireplace for heating – Mothers of infants									
Triche 2005	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	888	1.05 (1.01, 1.09)	HIGH
Wheeze									
Fire place for heating - Infants									
Triche 2002	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	890	0.25 (0.04, 1.43)	MODERATE
Fireplace for heating – Mothers of infants									
Triche 2005	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	888	1.07 (0.97, 1.18)	MODERATE
Chest tightness									
Fire place as heating – Mothers of infants									
Triche 2005	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	888	1.05 (0.99, 1.12)	MODERATE
Laryngitis									
Fire place heating as heating – Mothers of infants									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Triche 2005	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	888	1.02 (0.94, 1.10)	MODERATE
Phlegm									
Fire place as heating – Mothers of infants									
Triche 2005	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	888	1.04 (0.99, 1.09)	MODERATE
Runny / stuffy nose									
Fire place as heating – Mothers of infants									
Triche 2005	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	888	0.99 (0.95, 1.04)	MODERATE
Sore throat									
Fire place as heating – Mothers of infants									
Triche 2005	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	888	1.04 (1.00, 1.08)	HIGH
Breast cancer									
Indoor wood burning stove/fireplace – Women at risk of breast cancer									
White 2017	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	50884	aHR 1.11 (1.01,1.22)	HIGH
Heating fuel=wood – Women at risk of breast cancer									
White 2017	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	50884	aHR 1.09 (0.98,1.21)	MODERATE
Main source of heating=wood – Women at risk of breast cancer									
White 2017	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	50884	aHR 1.09 (0.82,1.45)	MODERATE
Wheeze without cold									
$PM_{2.5}$ source from residential wood combustion heating									
Pindus 2016	Prospective cohort	Serious[f]	NA[b]	Not serious[c]	Serious[d]	None	905	1.14 (0.75, 1.73)	LOW
Allergic rhinitis									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
$PM_{2.5}$ source from residential wood combustion heating									
Pindus 2016	Prospective cohort	Serious[f]	NA[b]	Not serious[c]	Not serious[e]	None	905	0.63 (0.42, 0.94)	MODERATE
Breathless									
$PM_{2.5}$ source from residential wood combustion heating									
Pindus 2016	Prospective cohort	Serious[f]	NA[b]	Not serious[c]	Serious[d]	None	905	0.97 (0.64, 1.48)	LOW
Chest tightness									
$PM_{2.5}$ source from residential wood combustion heating									
Pindus 2016	Prospective cohort	Serious[f]	NA[b]	Not serious[c]	Serious[d]	None	905	1.05 (0.72, 1.51)	LOW
Cardiac disease									
$PM_{2.5}$ source from residential wood combustion heating									
Pindus 2016	Prospective cohort	Serious[f]	NA[b]	Not serious[c]	Serious[d]	None	905	0.92 (0.60, 1.39)	LOW
Hypertension									
$PM_{2.5}$ source from residential wood combustion heating									
Pindus 2016	Prospective cohort	Serious[f]	NA[b]	Not serious[c]	Serious[d]	None	905	0.78 (0.54, 1.12)	LOW
Stroke									
$PM_{2.5}$ source from residential wood combustion heating									
Pindus 2016	Prospective cohort	Serious[f]	NA[b]	Not serious[c]	Serious[d]	None	905	0.85 (0.27, 2.71)	LOW
Heart infarction or angina pectoris									
$PM_{2.5}$ source from residential wood combustion heating									
Pindus 2016	Prospective cohort	Serious[f]	NA[b]	Not serious[c]	Serious[d]	None	905	0.67 (0.28, 1.56)	LOW
Otitis media									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Any episode									
Pettigrew 2004 b	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	813	1.14 (0.90, 1.45)	MODERATE
Otitis media, Recurrent (4 or more episodes of otitis media (separated by at least 21 days) in one year)									
Pettigrew 2004 b	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	813	0.99 (0.58, 1.72)	MODERATE

(a) No concerns over risk of bias
(b) Not applicable as only one study included
(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross line of no effect)
(e) No concerns as findings are statistically significant (95%CIs do not cross line of no effect)
(f) Serious concerns over risk of bias due to self-report of outcomes

F.1.2.2 Wood Stove

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Otitis media									
Any episode									
Pettigrew 2004 b	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	813	1.22 (0.66, 2.23)	MODERATE
Otitis media, Recurrent (4 or more episodes of otitis media (separated by at least 21 days) in one year)									
Pettigrew 2004 b	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	813	1.08 (0.85, 1.38)	MDOERATE

(a) No concerns over risk of bias
(b) Not applicable as only one study included
(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross line of no effect)

F.1.2.3 Heating or cooking fuel

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Bronchitis (ever diagnosed)									
East Germany									
Du Prel 2006	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	28888	1.02 (0.96, 1.09)	MODERATE
West Germany									
Du Prel 2006	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	28888	1.15 (1.00, 1.32)	HIGH
More than 4 colds in last 12 months									
East Germany									
Du Prel 2006	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	28888	1.13 (1.03, 1.23)	HIGH
West Germany									
Du Prel 2006	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	28888	0.96 (0.79, 1.18)	MODERATE
Frequent cough									
East Germany									
Du Prel 2006	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	28888	0.97 (0.86, 1.10)	MODERATE
West Germany									
Du Prel 2006	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	28888	0.88 (0.68, 1.15)	MODERATE
Sneeze attacks in the last 12 months									
East Germany									
Du Prel 2006	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	28888	0.92 (0.80, 1.06)	MODERATE
West Germany									
Du Prel 2006	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	28888	1.21 (0.88, 1.66)	MODERATE

No of studies	Design	Risk of bias	Inconsisten cy	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Allergy (ever diagnosed)									
East Germany									
Du Prel 2006	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[e]	None	28888	1.07 (0.96, 1.18)	MODERATE
West Germany									
Du Prel 2006	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[e]	None	28888	0.97 (0.79, 1.19)	MODERATE
Eczema (ever diagnosed)									
East Germany									
Du Prel 2006	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	28888	0.90 (0.83, 0.98)	HIGH
East Germany									
Du Prel 2006	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[e]	None	28888	1.07 (0.87, 1.32)	MODERATE
Overweight (BMI > kg/m2)									
East Germany									
Du Prel 2006	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[e]	None	28888	0.89 (0.78, 1.01)	MODERATE
West Germany									
Du Prel 2006	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[e]	None	28888	1.12 (0.86, 1.47)	MODERATE
Heating fuel=wood – Women at risk of breast cancer									
White 2017	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	None	50884	aHR 1.09 (0.98,1.21)	MODERATE

(a) No concerns over risk of bias
(b) Not applicable as only one study included
(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross line of no effect)
(e) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)

F.1.2.4 Coal heating

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Lower respiratory tract infections									
Baker 2006	Prospective cohort	Not serious[e]	NA[b]	Not serious[c]	Not serious[d]	None	452	aHR 1.45 (1.07, 1.97)	HIGH

(a) No concerns over risk of bias
(b) Not applicable as only one study included
(c) No concerns over directness
(d) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)

F.1.2.5 Artificial logs

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Breast cancer									
Heating fuel=artificial logs – Women at risk of breast cancer									
White 2017	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	50884	aHR 0.98 (0.85,1.12)	MODERATE

(a) No concerns over risk of bias
(b) Not applicable as only one study included
(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross line of no effect)

F.1.2.6 Fuel oil

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Breast cancer									
Main source of heating=fuel oil – Women at risk of breast cancer									
White 2017	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	50884	aHR 1.13 (0.97,1.32)	MODERATE

(a) No concerns over risk of bias
(b) Not applicable as only one study included
(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross line of no effect)

F.1.2.7 Cooking oil

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Bronchiolitis									
Use of seed oil for cooking									
Nenna 2017	Case control	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	416	1.82 (1.21; 2.74)	VERY LOW

(a) Very serious due to concerns over self-report of exposure and outcomes
(b) Not applicable as only one study included
(c) No concerns over directness
(d) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)

F.1.2.8 Paraffin (Kerosene) heating

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Cough									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Kerosene heater for heating - Infants									
Triche 2002	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	890	1.01 (0.93, 1.10)	MODERATE
Kerosene heater for heating – Mothers of infants									
Triche 2005	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	888	1.01 (0.99, 1.03)	MODERATE
Wheeze									
Kerosene heater for heating - Infants									
Triche 2002	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	890	0.90 (0.64, 1.25)	MODERATE
Kerosene heater for heating – Mothers of infants									
Triche 2005	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	888	1.06 (1.01, 1.11)	HIGH
Respiratory tract infections									
Kerosene heater as heating - Outcomes reported as Lower respiratory tract symptoms									
Li 2006	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	1137	1.41 (0.96, 2.07)	VERY LOW
Chest tightness									
Kerosene heater as heating – Mothers of infants									
Triche 2005	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	888	1.02 (0.99, 1.05)	MODERATE
Laryngitis									
Kerosene heater – Mothers of infants									
Triche 2005	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	888	1.01 (0.97, 1.04)	MODERATE
Phlegm									
Kerosene heater as heating – Mothers of infants									
Triche 2005	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	888	0.98 (0.93, 1.03)	MODERATE

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Runny / stuffy nose									
Kerosene heater as heating – Mothers of infants									
Triche 2005	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	888	1.01 (0.99, 1.03)	MODERATE
Sore throat									
Kerosene heater as heating – mothers of infants									
Triche 2005	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	888	1.00 (0.97, 1.02)	MODERATE
Otitis media									
Any episode									
Pettigrew 2004 b	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	813	0.94 (0.50, 1.78)	MODERATE
Otitis media, Recurrent (4 or more episodes of otitis media (separated by at least 21 days) in one year)									
Pettigrew 2004 b	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	813	0.91 (0.67, 1.25)	MDOERATE

(a) No concerns over risk of bias
(b) Not applicable as only one study included
(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross line of no effect)
(e) Very serious concerns due to self-report of exposure and outcomes
(f) No concerns as findings are statistically significant (95%CIs do not cross line of no effect)

F.1.3 Sources of allergens

F.1.3.1 Pets

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Wheeze									
Pets at home									
Casas 2012	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	5078	1.05 (0.83, 1.33)	LOW
Cat at home									
Herr 2012	Prospective cohort	Not serious[e]	NA[b]	Not serious[c]	Not serious[e]	None	1879	0.65 (0.47, 0.89)	HIGH
Zhou 2013	Prospective cohort	Not serious[e]	NA[b]	Not serious[c]	Serious[d]	None	1765	0.94 (0.61,1.46)	MODERATE
Dog in the home									
Litonjua 2002	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	226	0.12 (0.01, 0.97)	MODERATE
Asthma									
Pet ownership in childhood									
Casas 2012	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	5078	0.69 (0.52, 0.91)	MODERATE
McConnell 2002	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	3535	1.60 (1.00, 2.50)	MODERATE
Contact with cats									
Zhou 2013	Prospective cohort	Not serious[f]	NA[b]	Not serious[h]	Not serious[e]	None	1765	0.27 (0.08, 0.86)	HIGH
Exposure to cats (children with wheeze at baseline)									
Korppi 2008	Prospective cohort	Serious[a]	NA[b]	Not serious[h]	Serious[d]	None	100	0.26 (0.03, 2.42)	LOW
Exposure to dogs (children with wheeze at baseline)									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Korppi 2008	Prospective cohort	Serious[a]	NA[b]	Not serious[h]	Serious[d]	None	100	0.20 (0.02, 1.78)	LOW
Any pet (children with wheeze at baseline)									
McConnell 2002	Prospective cohort	Not serious[g]	NA[b]	Not serious[h]	Serious[d]	None	3535	1.10 (0.60, 2.00)	MODERATE
Bronchiolitis									
Contact with cats									
Zhou 2013	Prospective cohort	Not serious[g]	NA[b]	Not serious[c]	Serious[d]	None	1765	0.69 (0.47,1.03)	MODERATE
Papillary thyroid cancer									
Pet ownership in childhood									
Clarke 2015	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	61799	aRR 0.77 (0.51, 1.17)	LOW
Airway hyper-responsiveness									
Pet ownership									
Hagmolen of Ten Have 2007	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	526	1.17 (0.70, 1.94)	VERY LOW
Type 1 diabetes (clinical or pre-clinical)									
Indoor dog									
Virtanen 2014	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	3143	0.40 (0.14, 1.14)	LOW
Indoor cat									
Virtanen 2014	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	3143	1.34 (0.58, 3.10)	LOW
Irritable bowel syndrome									
Pet exposure									
Koloski 2015	Prospective cohort	Not serious[f]	NA[b]	Not serious[h]	Serious[d]	None	767	1.47 (0.83, 2.61)	MODERATE

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Herbivore pet									
Koloski 2015	Prospective cohort	Not serious[f]	NA[b]	Not serious[h]	Not serious[e]	None	767	2.09 (1.19, 3.67)	HIGH
Carnivore pet									
Koloski 2015	Prospective cohort	Not serious[f]	NA[b]	Not serious[h]	Serious[d]	None	767	1.58 (0.90, 2.76)	MODERATE
Omnivore pet									
Koloski 2015	Prospective cohort	Not serious[f]	NA[b]	Not serious[h]	Serious[d]	None	767	0.97 (0.26, 3.59)	MODERATE
Functional dyspepsia									
Any pet exposure									
Koloski 2015	Prospective cohort	Not serious[f]	NA[b]	Not serious[h]	Serious[d]	None	767	1.69 (0.86, 3.36)	MODERATE
Herbivore pet									
Koloski 2015	Prospective cohort	Not serious[f]	NA[b]	Not serious[h]	Not serious[e]	None	767	2.34 (1.24, 4.45)	HIGH
Carnivore pet									
Koloski 2015	Prospective cohort	Not serious[f]	NA[b]	Not serious[h]	Not serious[e]	None	767	2.04 (1.03, 4.03)	HIGH
Omnivore pet									
Koloski 2015	Prospective cohort	Not serious[g]	NA[b]	Not serious[h]	Serious[d]	None	767	0.98 (0.21, 4.50)	MODERATE
Otitis media									
Any episode									
Pettigrew 2004 b	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	None	813	0.76 (0.47, 1.26)	MODERATE
Otitis media, Recurrent (4 or more episodes of otitis media (separated by at least 21 days) in one year)									
Pettigrew 2004 b	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	None	813	1.06 (0.90, 1.25)	MODERATE

(a) Serious concerns over risk of bias due to concerns over self-report of exposure
(b) Not applicable as only one study included
(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross line of no effect)
(e) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)
(f) No concerns over risk of bias

F.1.3.21 Carpet flooring

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Wheeze									
During pregnancy									
Franck 2014	Cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	465	5.39 (1.75, 16.54)	HIGH
During first year of life)									
Franck 2014	Cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[e]	None	465	4.18 (0.40, 43.70)	MODERATE
Obstructive bronchitis									
During pregnancy									
Franck 2014	Cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	465	4.39 (1.01, 19.05)	HIGH

(a) No concerns over risk of bias
(b) Not applicable as only one study included
(c) No concerns over directness
(d) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)
(e) Serious concerns as findings are not statistically significant (95%CIs cross line of no effect)

F.1.3.3 Second-hand mattress

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Cough									
Used mattress - infants with parental history of allergy									
Roda 2013	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	2898	1.47 (1.00, 2.17)	MODERATE
Used mattress - infants with no parental history of allergy									
Roda 2013	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[e]	None	2898	1.22 (0.80, 1.88)	LOW

(a) Serious concerns over risk of bias due to self-report of outcomes
(b) Not applicable as only one study included
(c) No concerns over directness
(d) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)
(e) Serious concerns as findings are not statistically significant (95%CIs cross line of no effect)

F.1.4 Sources of dampness and health outcomes

F.1.4.1 High air humidity in the bathroom

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Cough									
Engvall 2001	Retrospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	9808	2.30 (2.21, 2.40)	LOW
Nasal symptoms									
Engvall 2001	Retrospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	9808	1.94 (1.88, 2.01)	LOW
Throat symptoms									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Engvall 2001	Retrospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	9808	3.23 (3.12, 3.25)	LOW
Facial skin symptoms									
Engvall 2001	Retrospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	9808	2.42 (2.33, 2.51)	LOW
Headache									
Engvall 2001	Retrospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	9808	3.07 (2.96, 3.17)	LOW
Tiredness									
Engvall 2001	Retrospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	9808	2.16 (2.11, 2.22)	LOW
Eye irritation									
Engvall 2001	Retrospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	9808	2.94 (2.83, 3.05)	LOW

(a) Very serious concerns over risk of bias due to self-report of outcomes and exposures
(b) Not applicable as only one study included
(c) No concerns over directness
(d) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)

F.1.4.2 Condensation on windows

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Cough									
Engvall 2001	Retrospective cohort	Very serious[f]	NA[b]	Not serious[c]	Not serious[d]	None	9808	2.58 (2.47, 2.70)	LOW
Asthma									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Norback 2013	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[e]	None	7104	aRR 1.07 (0.75, 1.53)	VERY LOW
Asthma and airway hyper-responsiveness									
Norback 2013	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[e]	None	7104	aRR 1.43 (0.67, 3.07)	VERY LOW
Acute respiratory infection									
Heavy condensation in the room where child sleeps at night (not very often)									
Tin Tin 2016	Prospective cohort	Serious[f]	NA[b]	Not serious[c]	Serious[e]	None	6853	1.00 (0.86, 1.17)	LOW
Heavy condensation in the room where child sleeps at night (quite often)									
Tin Tin 2016	Prospective cohort	Serious[f]	NA[b]	Not serious[c]	Serious[e]	None	6853	1.05 (0.88, 1.27)	LOW
Heavy condensation in the room where child sleeps at night (Always or almost always)									
Tin Tin 2016	Prospective cohort	Serious[f]	NA[b]	Not serious[c]	Serious[e]	None	6853	1.00 (0.77, 1.31)	LOW
Nasal symptoms									
Engvall 2001	Retrospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	9808	2.72 (2.62, 2.81)	LOW
Throat symptoms									
Engvall 2001	Retrospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	9808	3.22 (3.09, 3.35)	LOW
Facial skin symptoms									
Engvall 2001	Retrospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	9808	2.11 (2.02, 2.20)	LOW
Headache									
Engvall 2001	Retrospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	9808	3.30 (3.19, 3.43)	LOW
Tiredness									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Engvall 2001	Retrospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	9808	2.19 (2.12, 2.25)	LOW
Eye irritation									
Engvall 2001	Retrospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	9808	3.14 (3.01, 3.27)	LOW
Autistic spectrum disorders									
Condensation on windows (1- 5 cm) in child's room									
Larsson 2009	Cohort	Not serious[g]	NA[b]	Not serious[c]	Serious[e]	None	4779	1.35 (0.71, 2.57)	MODERATE
Condensation on windows (> 5 cm) in child's room									
Larsson 2009	Cohort	Not serious[g]	NA[b]	Not serious[c]	Not serious[d]	None	4779	2.05 (1.03, 4.10)	HIGH
Condensation on windows (1- 5 cm) in parent's room									
Larsson 2009	Cohort	Not serious[g]	NA[b]	Not serious[c]	Serious[e]	None	4779	1.52 (0.84, 2.73)	MODERATE
Condensation on windows (> 5 cm) in parent's room									
Larsson 2009	Cohort	Not serious[g]	NA[b]	Not serious[c]	Not serious[d]	None	4779	2.03 (1.08, 3.82)	HIGH

(a) Very serious concerns over risk of bias due to self-report of outcomes and exposures
(b) Not applicable as only one study included
(c) No concerns over directness
(d) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)
(e) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)
(f) Serious concerns over risk of bias due to self-report of exposure
(g) No concerns over risk of bias

F.1.4.3 Moisture on walls / surfaces

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Allergic rhinoconjunctivitis									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Ibargoyen-Roteta 2007	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	3360	1.90 (1.01, 3.56)	LOW
Asthma									
Jaakkola 2005	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[e]	None	1916	0.92 (0.54, 1.54)	VERY LOW

(a) Very serious concerns over risk of bias due to self-report of outcomes and exposures
(b) Not applicable as only one study included
(c) No concerns over directness
(d) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)
(e) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)

F.1.4.4 History of water leakage

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Cough									
Engvall 2001	Retrospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	9808	1.52 (1.44, 1.59)	LOW
Nasal symptoms									
Engvall 2001	Retrospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	9808	1.36 (1.31, 1.41)	LOW

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Throat symptoms									
Engvall 2001	Retrospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	9808	2.18 (2.09, 2.28)	LOW
Facial skin symptoms									
Engvall 2001	Retrospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	9808	1.56 (1.48, 1.63)	LOW
Headache									
Engvall 2001	Retrospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	9808	1.27 (1.21, 1.33)	LOW
Tiredness									
Engvall 2001	Retrospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	9808	2.19 (2.12, 2.25)	LOW
Eye irritation									
Engvall 2001	Retrospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	9808	1.57 (1.50, 1.65)	LOW

(a) Very serious concerns over risk of bias due to self-report of outcomes and exposures
(b) Not applicable as only one study included
(c) No concerns over directness
(d) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)

F.1.4.5 Water damage

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Allergic rhinitis									
Jaakkola 2010	Prospective cohort	Very serious[a]	NA[b]	Not serious[e]	Not serious[d]	None	1863	2.06 (1.35, 3.13)	LOW
Asthma									
Jaakkola 2005	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[e]	None	1916	1.01 (0.45, 2.26	VERY LOW
Lower respiratory illness									
Reported as water damage or mould / mildew									
Stark 2003	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	None	499	1.34 (0.99, 1.82)	MODERATE

(a) Very serious concerns over risk of bias due to self-report of outcomes and exposures
(b) Not applicable as only one study included
(c) No concerns over directness
(d) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)
(e) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)
(f) No concerns over risk of bias

F.1.4.6 Damp condition

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Bronchitis (ever diagnosed)									
East Germany									
Du Prel 2006	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	28888	1.25 (1.13, 1.37)	HIGH
West Germany									
Du Prel 2006	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	28888	1.30 (1.03, 1.65)	HIGH

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
More than 4 colds in last 12 months									
East Germany									
Du Prel 2006	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	28888	1.41 (1.25, 1.60)	HIGH
West Germany									
Du Prel 2006	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	28888	1.62 (1.21, 2.17)	HIGH
Frequent cough									
East Germany									
Du Prel 2006	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	28888	1.66 (1.42, 1.95)	HIGH
West Germany									
Du Prel 2006	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	28888	2.60 (1.90, 3.55)	HIGH
Sneeze attacks in the last 12 months									
East Germany									
Du Prel 2006	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	28888	1.52 (1.26, 1.83)	HIGH
West Germany									
Du Prel 2006	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	28888	2.25 (1.52, 3.33)	HIGH
Allergy (ever diagnosed)									
East Germany									
Du Prel 2006	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[e]	None	28888	1.09 (0.93, 1.28)	MODERATE
West Germany									
Du Prel 2006	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[e]	None	28888	1.20 (0.87, 1.66)	MODERATE
Eczema (ever diagnosed)									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
East Germany									
Du Prel 2006	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	28888	1.15 (1.01, 1.31)	HIGH
West Germany									
Du Prel 2006	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[e]	None	28888	1.10 (0.77, 1.57)	MODERATE

(a) No concerns over risk of bias
(b) Not applicable as only one study included
(c) No concerns over directness
(d) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)
(e) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)

F.1.5 Source of VOCs

F.1.5.1 Parquet flooring

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Wheeze									
During pregnancy									
Franck 2014	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	465	5.78 (0.30, 111.08)	MODERATE

(a) No concerns over risk of bias
(b) Not applicable as only one study included
(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)

F.1.5.2 Laminate flooring

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Wheeze									
Laminate flooring (during pregnancy)									
Franck 2014	Cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	465	4.46 (1.01, 19.63)	HIGH
Laminate flooring (during 1st year in life)									
Franck 2014	Cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[e]	None	465	2.44 (0.40, 14.74)	MODERATE

(a) No concerns over risk of bias
(b) Not applicable as only one study included
(c) No concerns over directness
(d) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)
(e) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)

F.1.5.3 PVC flooring

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Wheeze									
PVC flooring (during pregnancy)									
Franck 2014	Cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	465	24.7 (2.18, 280.39)	HIGH
PVC flooring (during 1st year in life)									
Franck 2014	Cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	465	51.7 (3.21, 833.2)	HIGH
Asthma									
PVC vs. other flooring material in child's bedroom (5 years)									
Shu 200	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Serious[f]	None	3228	1.50 (0.91, 2.47)	LOW
PVC vs. Wood flooring material in child's bedroom (5 years)									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Shu 200	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Not serious[d]	None	3228	1.54 (1.06, 2.23)	MODERATE
PVC vs. other flooring material in parent's bedroom (5 years)									
Shu 200	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Not serious[d]	None	3228	1.71 (1.05, 2.80)	MODERATE
PVC vs. wood flooring material in parent's bedroom (5 years)									
Shu 200	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Not serious[d]	None	3228	1.60 (1.29, 2.81)	MODERATE
PVC vs. other flooring material in child's bedroom (10 years)									
Shu 200	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Not serious[d]	None	3228	1.54 (1.06, 2.23)	MODERATE
PVC vs. Wood flooring material in child's bedroom (10 years)									
Shu 200	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Serious[f]	None	3228	1.37 (0.92, 2.04)	LOW
PVC vs. other flooring material in parent's bedroom (10 years)									
Shu 200	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Not serious[d]	None	3228	2.04 (1.41, 2.94)	MODERATE
PVC vs. Wood flooring material in parent's bedroom (10 years)									
Shu 200	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Not serious[d]	None	3228	1.90 (1.29, 2.81)	MODERATE
PVC flooring in child's bedroom									
Larsson 2010	Cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[f]	None	2779	1.52 (0.99, 2.35)	MODERATE
PVC flooring in parent's bedroom									
Larsson 2010	Cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[f]	None	2779	1.48 (0.86, 2.57)	MODERATE
Autistic spectrum disorders									
PVC flooring in child's bedroom									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Larsson 2009	Cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[f]	None	4779	1.19 (0.71, 2.00)	MODERATE
PVC flooring in parent's bedroom									
Larsson 2009	Cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[f]	None	4779	1.59 (0.97, 2.61)	MODERATE

(a) No concerns over risk of bias
(b) Not applicable as only one study included
(c) No concerns over directness
(d) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)
(e) Serious concerns over risk of bias due to self-report of outcomes
(f) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)

F.1.5.4 New furniture

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Recurrent wheeze									
During pregnancy									
Franck 2014	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	465	1.94 (0.72, 5.26)	MODERATE
During 1st year of life									
Franck 2014	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	465	2.26 (0.83, 6.17)	MODERATE

(a) No concerns over risk of bias
(b) Not applicable as only one study included
(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)

F.1.5.5 Home products - Air fresheners

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Asthma									
Any perfumed or scented product									
Zock 2007	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	3503	1.29 (0.74, 2.26)	VERY LOW
Air-refreshing sprays									
Zock 2007	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	3503	1.46 (0.78, 2.70)	VERY LOW
Wheeze									
Air fresheners									
Casas 2013	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Serious[d]	None	2292	1.09 (0.87, 1.37)	LOW
Air fresheners during pregnancy only									
Casas 2013	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Serious[d]	None	2292	1.39 (0.85, 2.29)	LOW
Air fresheners after pregnancy only									
Casas 2013	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Not serious[f]	None	2292	1.75 (1.01, 3.04)	MODERATE
Air fresheners during and after pregnancy									
Casas 2013	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Serious[d]	None	2292	1.23 (0.79, 1.93)	LOW
Any perfumed or scented product									
Zock 2007	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	3503	1.11 (0.83, 1.49)	VERY LOW
Air-refreshing sprays									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Zock 2007	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	3503	1.36 (0.98, 1.88)	VERY LOW
Lower respiratory tract infections									
Air fresheners									
Casas 2013	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Not serious[f]	None	2292	1.29 (1.03, 1.63)	MODERATE
Air fresheners during pregnancy only									
Casas 2013	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	2292	1.31 (0.77, 2.21)	LOW
Air fresheners after pregnancy only									
Casas 2013	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Not serious[f]	None	2292	1.85 (1.04, 3.30)	MODERATE
Air fresheners during and after pregnancy									
Casas 2013	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Not serious[f]	None	2292	1.59 (1.00, 2.55)	MODERATE
Diarrhoea									
Air freshener use once a week during pregnancy – Diarrhoea in infants									
Farrow 2003	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Not serious[f]	None	13971	1.20 (1.06, 1.35)	MODERATE
Air freshener use most days during pregnancy – Diarrhoea in infants									
Farrow 2003	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Serious[d]	None	13971	1.10 (0.99, 1.23)	LOW
Air freshener once a week during pregnancy – Diarrhoea in mothers 9 to 21 months after birth									
Farrow 2003	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Not serious[f]	None	14541	1.14 (1.00, 1.31)	MODERATE
Air freshener most days during pregnancy – Diarrhoea in mothers 9 to 21 months after birth									
Farrow 2003	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Not serious[f]	None	14541	1.14 (1.01, 1.28)	MODERATE
Vomiting									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Air freshener use once a week during pregnancy – vomiting in infants									
Farrow 2003	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Serious[d]	None	13971	1.06 (0.93, 1.20)	LOW
Air freshener use most days during pregnancy – vomiting in infants									
Farrow 2003	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Serious[d]	None	13971	1.09 (0.97, 1.22)	LOW
Earache									
Air freshener use once a week during pregnancy – earache in infants									
Farrow 2003	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Not serious[f]	None	14541	1.24 (1.02, 1.50)	MODERATE
Air freshener use most days during pregnancy – earache in infants									
Farrow 2003	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Not serious[f]	None	14541	1.30 (1.09, 1.54)	MODERATE
Depression									
Air freshener use once a week during pregnancy – depression in mothers 8 months after birth									
Farrow 2003	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Serious[d]	None	14541	1.11 (0.96, 1.29)	LOW
Air freshener use most days during pregnancy – depression in mothers 8 months after birth									
Farrow 2003	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Not serious[f]	None	14541	1.19 (1.05, 1.36)	MODERATE
Headache									
Air freshener use once a week during pregnancy – headache in mothers 8 months after birth									
Farrow 2003	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Serious[d]	None	14541	1.06 (0.94, 1.19)	LOW
Air freshener use once a week during pregnancy – headache in mothers 9 to 21 months after birth									
Farrow 2003	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Not serious[f]	None	14541	1.29 (1.14, 1.47)	MODERATE
Air freshener use most days during pregnancy – headache in mothers 8 months after birth									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Farrow 2003	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Not serious[f]	None	14541	1.24 (1.11, 1.38)	MODERATE
Air freshener use most days during pregnancy – headache in mothers 9 to 21 months after birth									
Farrow 2003	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Not serious[f]	None	14541	1.22 (1.09, 1.36)	MODERATE
Cough or cold									
Air freshener use once a week during pregnancy – cough/cold in mothers 9 to 21 months after birth									
Farrow 2003	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Serious[d]	None	14541	1.03 (0.87, 1.20)	LOW
Air freshener use most days during pregnancy – cough/cold in mothers 9 to 21 months after birth									
Farrow 2003	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Serious[d]	None	14541	0.82 (0.72, 0.93)	LOW

(a) Very serious risk of bias due to concerns over self-report of outcomes and exposure
(b) Not applicable as only one study included
(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)
(e) Serious risk of bias due to concerns over self-report of outcomes
(f) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)

F.1.5.6 Home products - Cleaning sprays

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Asthma									
1 type of spray used ≥1 day/week									
Le Moual 2012	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	683	0.68 (0.44, 1.04)	VERY LOW
≥ 2 types of sprays used ≥1 day/week									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Le Moual 2012	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	683	1.67 (1.08, 2.56)	LOW
Household spray – Low use									
Weinmann 2017	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	1895	0.70 (0.23, 2.06)	VERY LOW
Household spray – Medium use									
Weinmann 2017	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	1895	0.78 (0.26, 2.36)	VERY LOW
Household spray – High use									
Weinmann 2017	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	1895	2.79 (0.84, 9.20)	VERY LOW
Any spray									
Zock 2007	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	3503	1.28 (0.78, 2.09)	VERY LOW
Use of spray(s) 1 to 3 d/wk									
Zock 2007	Prospective cohort	Very serious[e]	NA[b]	Not serious[c]	Serious[d]	None	3503	0.93 (0.51, 1.67)	VERY LOW
Use of spray(s) 4 to 7 d/wk									
Zock 2007	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	3503	2.11 (1.15, 3.89)	LOW
Spray use ≥1 day/week									
Bedard 2014	Nested case-control	Serious[f]	NA[b]	Not serious[c]	Serious[d]	None	570	1.45 (0.94, 2.24)	LOW
One type of spray used > 1 d/wk									
Zock 2007	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	3503	0.97 (0.53, 1.77)	VERY LOW
Two types of spray used > 1 d/wk									
Zock 2007	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	3503	1.47 (0.70, 3.06)	VERY LOW

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Three or more types of spray used > 1 d/wk									
Zock 2007	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	3503	2.96 (1.33, 6.56)	LOW
Furniture sprays									
Zock 2007	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	3503	2.46 (1.26, 4.80)	LOW
Glass-cleaning sprays									
Zock 2007	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	3503	1.43 (0.84, 2.44)	VERY LOW
Sprays for carpets, rugs, curtains									
Zock 2007	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	3503	0.80 (0.11, 5.93)	VERY LOW
Sprays for mopping the floor									
Zock 2007	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	3503	0.93 (0.30, 2.85)	VERY LOW
Oven sprays									
Zock 2007	Prospective cohort	Very serious[e]	NA[b]	Not serious[c]	Serious[d]	None	3503	0.63 (0.09, 4.64)	VERY LOW
Ironing sprays									
Zock 2007	Prospective cohort	Very serious[e]	NA[b]	Not serious[c]	Serious[d]	None	3503	1.51 (0.46, 4.96)	VERY LOW
Wheeze									
Sprays									
Casas 2013	Prospective cohort	Serious[g]	NA[b]	Not serious[c]	Not serious[e]	None	2292	1.37 (1.10, 1.69)	MODERATE
Spray during pregnancy only									
Casas 2013	Prospective cohort	Serious[g]	NA[b]	Not serious[c]	Not serious[e]	None	2292	1.62 (1.11, 2.36)	MODERATE
Spray after pregnancy only									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Casas 2013	Prospective cohort	Serious[g]	NA[b]	Not serious[c]	Serious[d]	None	2292	1.34 (0.80, 2.24)	LOW
Spray during and after pregnancy									
Casas 2013	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	2292	1.61 (1.08, 2.41)	MODERATE
Household spray - Low use									
Weinmann 2017	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	633	1.53 (0.88, 2.65)	VERY LOW
Household spray -medium use									
Weinmann 2017	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	633	1.34 (0.75, 2.39)	VERY LOW
Household spray -High use									
Weinmann 2017	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	633	1.71 (0.80, 3.67)	VERY LOW
Daily use of cleaning sprays									
Herr 2012	Prospective cohort	Not serious[g]	NA[b]	Not serious[c]	Serious[d]	None	1879	1.50 (0.97, 2.32)	MODERATE
Asthma attack and/or nocturnal shortness of breath									
Any spray									
Zock 2007	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	3503	1.49 (1.12, 1.99)	LOW
Use of spray(s) 1 to 3 d/wk									
Zock 2007	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	3503	1.36 (0.99,1.89)	VERY LOW
Use of spray(s) 4 to 7 d/wk									
Zock 2007	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	3503	1.75 (1.21,2.54)	LOW
One type of spray used > 1 d/wk									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Zock 2007	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	3503	1.37 (0.99, 1.90)	VERY LOW
Two types of spray used > 1 d/wk									
Zock 2007	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	3503	1.45 (0.92, 2.27)	VERY LOW
Three or more types of spray used > 1 d/wk									
Zock 2007	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	3503	2.40 (1.47, 3.91)	LOW

(a) Very serious risk of bias due to concerns over self-report of outcomes and exposure
(b) Not applicable as only one study included
(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)
(e) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)
(f) Serious risk of bias due to concerns over self-report of exposure
(g) Serious risk of bias due to concerns over self-report of outcomes

F.1.5.7 Home products - Solvents

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Asthma									
Solvents, stain removers									
Zock 2007	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	3503	0.48 (0.12, 1.97)	VERY LOW

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Wheeze									
Solvents									
Solvents, stain removers									
Zock 2007	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	3503	2.00 (1.30, 3.07)	LOW
Lower respiratory tract infections									
Spray and solvents									
Casas 2013	Prospective cohort	Serious[f]	NA[b]	Not serious[c]	Not serious[e]	None	2292	1.54 (1.11, 2.14)	MODERATE
Solvents									
Casas 2013	Prospective cohort	Serious[f]	NA[b]	Not serious[c]	Serious[d]	None	2292	1.19 (0.95, 1.48)	LOW
Wheeze									
Solvent - Exposed prenatally, not exposed postnatally									
Bajeux 2014	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	1505	0.89 (0.34, 2.31)	VERY LOW
Casas 2013	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	1157	1.04 (0.71, 1.51)	VERY LOW
Solvent - Not exposed prenatally, exposed postnatally									
Bajeux 2014	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	1505	1.66 (1.11, 2.47)	LOW
Casas 2013	Prospective cohort	Serious[f]	NA[b]	Not serious[c]	Serious[d]	None	1157	0.87 (0.55, 1.37)	LOW
Solvent - Exposed both prenatally and postnatally									
Bajeux 2014	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	1505	2.50 (1.45, 4.33)	LOW
Casas 2013	Prospective cohort	Serious[f]	NA[b]	Not serious[c]	Serious[d]	None	1157	1.81 (0.98, 3.37)	LOW
Solvents									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Casas 2013	Prospective cohort	Serious[f]	NA[b]	Not serious[c]	Not serious[e]	None	2292	1.30 (1.03, 1.62)	MODERATE
Solvents, stain removers									
Zock 2007	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	3503	2.00 (1.30, 3.07)	LOW
Eczema									
Prenatal and not postnatal solvent exposure									
Bajeux 2014	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	1505	0.72 (0.35, 1.50)	VERY LOW
Postnatal and not prenatal solvent exposure									
Bajeux 2014	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	1505	1.03 (0.79, 1.36)	VERY LOW
Prenatal and postnatal solvent exposure									
Bajeux 2014	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	1505	1.23 (0.84, 1.82)	VERY LOW
Food allergies									
Exposed prenatally, not exposed postnatally									
Bajeux 2014	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	1505	1.25 (0.41, 3.80)	VERY LOW
Not exposed prenatally, exposed postnatally									
Bajeux 2014	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	1505	1.28 (0.80, 2.03)	VERY LOW
Exposed both prenatally and postnatally									
Bajeux 2014	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	1505	1.32 (0.71, 2.46)	VERY LOW

(a) Very serious risk of bias due to concerns over self-report of outcomes and exposure
(b) Not applicable as only one study included
(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)
(e) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)
(f) Serious risk of bias due to concerns over self-report of outcomes

F.1.5.8 Home products – Aerosols

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Diarrhoea									
Aerosol use once a week during pregnancy – Diarrhoea in infants									
Farrow 2003	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	13971	1.09 (0.93, 1.28)	LOW
Aerosol use daily or most days during pregnancy – Diarrhoea in infants									
Farrow 2003	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	13971	1.22 (1.09, 1.36)	MODERATE
Vomiting									
Aerosol use once a week during pregnancy – vomiting in infants									
Farrow 2003	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	14541	1.17 (1.00, 1.37)	MODERATE
Aerosol use daily or most days during pregnancy – vomiting in infants									
Farrow 2003	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	14541	1.14 (1.02, 1.27)	MODERATE
Earache									
Aerosol use once a week during pregnancy – earache in infants									
Farrow 2003	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	13971	1.00 (0.78, 1.29)	LOW
Aerosol use daily or most days during pregnancy – earache in infants									
Farrow 2003	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	13971	1.05 (0.84, 1.25)	LOW
Depression									
Aerosol use once a week during pregnancy – depression in mothers 8 months after birth									
Farrow 2003	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	14541	1.06 (0.88, 1.27)	LOW
Aerosol use daily or most days during pregnancy – depression in mothers 8 months after birth									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Farrow 2003	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	serious[d]	None	14541	1.03 (0.91, 1.17)	LOW
Headache									
Aerosol use once a week during pregnancy – headache in mothers 8 months after birth									
Farrow 2003	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	14541	1.16 (1.00, 1.35)	MODERATE
Aerosol use once a week during pregnancy – headache in mothers 9 to 21 months after birth									
Farrow 2003	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	14541	1.35 (1.15, 1.59)	MODERATE
Aerosol use most days during pregnancy – headache in mothers 8 months after birth									
Farrow 2003	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	14541	1.25 (1.13, 1.39)	MODERATE
Aerosol use most days during pregnancy – headache in mothers 9 to 21 months after birth									
Farrow 2003	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	14541	1.21 (1.10, 1.34)	MODERATE
Influenzas									
Aerosol use once a week during pregnancy –Influenza in mothers 9 to 21 months after birth									
Farrow 2003	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	14541	1.03 (0.85, 1.24)	LOW
Aerosol use most days during pregnancy – influenza in mothers 9 to 21 months after birth									
Farrow 2003	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	14541	0.87 (0.77, 0.99)	MODERATE
Urinary tract infection									
Aerosol use once a week during pregnancy –UTI in mothers 9 to 21 months after birth									
Farrow 2003	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	14541	1.16 (0.89, 1.52)	LOW
Aerosol use most days during pregnancy – UTI in mothers 9 to 21 months after birth									
Farrow 2003	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	14541	1.23 (1.04, 1.45)	MODERATE

(a) Serious risk of bias due to concerns over self-report of outcomes
(b) Not applicable as only one study included
(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)
(e) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)

F.1.5.9 Paint

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Congenital anomalies									
All congenital malformations - Paint fumes in the residence during the 1st trimester of pregnancy									
Hjortebjerg 2012	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	20103	0.95 (0.74, 1.21)	MODERATE
Nervous system - Paint fumes in the residence during the 1st trimester of pregnancy									
Hjortebjerg 2012	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	20103	2.19 (0.76, 6.32)	MODERATE
Eye - Paint fumes in the residence during the 1st trimester of pregnancy									
Hjortebjerg 2012	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	20103	1.79 (0.70, 4.57)	MODERATE
Ear, face and neck - Paint fumes in the residence during the 1st trimester of pregnancy									
Hjortebjerg 2012	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	20103	2.15 (0.84, 5.55)	MODERATE
Congenital heart defects - Paint fumes in the residence during the 1st trimester of pregnancy									
Hjortebjerg 2012	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	20103	0.76 (0.39, 1.49)	MODERATE
Respiratory system - Paint fumes in the residence during the 1st trimester of pregnancy									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Hjortebjerg 2012	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	20103	1.13 (0.27, 4.79)	MODERATE
Cleft lip and cleft palate - Paint fumes in the residence during the 1st trimester of pregnancy									
Hjortebjerg 2012	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	20103	1.06 (0.33, 3.46)	MODERATE
Digestive system - Paint fumes in the residence during the 1st trimester of pregnancy									
Hjortebjerg 2012	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	20103	0.61 (0.15, 2.50)	MODERATE
Renal - Paint fumes in the residence during the 1st trimester of pregnancy									
Hjortebjerg 2012	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	20103	2.16 (1.02, 4.58)	HIGH
Genital - Paint fumes in the residence during the 1st trimester of pregnancy									
Hjortebjerg 2012	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	20103	0.83 (0.48, 1.43)	MODERATE
Limb defects - Paint fumes in the residence during the 1st trimester of pregnancy									
Hjortebjerg 2012	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	20103	0.82 (0.54, 1.24)	MODERATE
Muscula and skeletal - Paint fumes in the residence during the 1st trimester of pregnancy									
Hjortebjerg 2012	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	20103	1.77 (0.75, 4.16)	MODERATE
Other malformation - Paint fumes in the residence during the 1st trimester of pregnancy									
Hjortebjerg 2012	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	20103	1.24 (0.62, 2.46)	MODERATE
Obstructive bronchitis in first year of life (Physician diagnosis)									
Painting during pregnancy									
Franck 2014	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	465	5.46 (1.09, 27.20)	HIGH
Recurrent wheeze									
Painting during pregnancy									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Franck 2014	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	465	2.35 (0.89, 6.20)	MODERATE
Painting during 1st year in life									
Franck 2014	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	465	2.53 (0.85, 7.49)	MODERATE
Small for gestational age									
Exposure to paint fumes during pregnancy									
Sorensen 2010	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	19000	0.89 (0.81, 0.98)	HIGH
Preterm birth									
Exposure to paint fumes during pregnancy									
Sorensen 2010	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	19000	0.95 (0.82, 1.11)	MODERATE

(a) No concerns over risk of bias
(b) Not applicable as only one study included
(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)
(e) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)

F.1.5.10 Any type of redecoration

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Recurrent wheeze									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Any type of redecoration during pregnancy									
Franck 2014	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	465	2.04 (0.78, 5.28)	MODERATE
Any type of redecoration during 1st year of life									
Franck 2014	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	465	1.89 (0.71, 5.06)	MODERATE
Redecoration after birth in first 18th months of life									
Herr 2012	Prospective cohort	Not serious[e]	NA[b]	Not serious[c]	Serious[d]	None	1879	1.22 (0.96, 1.54)	MODERATE
Pulmonary infections									
Restoration (parent report)									
Diez 2002	Nested case-control	Serious[e]	NA[b]	Not serious[c]	Not serious[f]	None	475	5.6 (1.3, 24.0)	LOW

(a) No concerns over risk of bias
(b) Not applicable as only one study included
(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)
(e) Serious concerns over risk of bias due to self-report of outcomes
(f) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)

F.1.6 Building characteristics and health outcomes

F.1.6.1 Building age

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Recurrent wheeze									
1940–75									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Emenius 2003	Nested case control	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	540	1.69 (1.01, 2.89)	MODERATE
1975 onwards									
Emenius 2003	Nested case control	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	540	1.86 (1.05, 3.27)	MODERATE

(g) No concerns over risk of bias
(a) Not applicable as only one study included
(b) No concerns over directness
(c) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)

F.1.6.2 Dwelling size

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Lower respiratory tract infections									
Per room increase in the household – Outcome reported as Lower respiratory tract infections									
Li 2006	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	1137	0.99 (0.92, 1.06)	VERY LOW

(a) Very serious concerns over risk of bias due to self-report of outcomes and exposures
(b) Not applicable as only one study included
(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)

F.1.6.3 Central air-conditioning

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Asthma									
Reponen 2011	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	176	0.3 (0.14, 0.83)	HIGH
Otitis media									
Any episode									
Pettigrew 2004 b	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[e]	None	813	0.52 (0.27, 1.03)	MODERATE
Otitis media, Recurrent (4 or more episodes of otitis media (separated by at least 21 days) in one year)									
Pettigrew 2004 b	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	813	0.93 (0.77, 1.11)	MDOERATE

(a) No concerns over risk of bias
(b) Not applicable as only one study included
(c) No concerns over directness
(d) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)
(e) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)

F.1.6.4 Ventilation rate

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Asthma and allergic symptoms									
Ventilation rate - Third quartile vs. fourth quartile									
Bornehag 2005	Nested case-control	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	400	1.17 (0.57, 2.42)	LOW
Ventilation rate - Second quartile vs. fourth quartile									
Bornehag 2005	Nested case-control	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	400	1.35 (0.66, 2.74)	LOW

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Ventilation rate - First quartile vs. fourth quartile									
Bornehag 2005	Nested case-control	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	400	1.95 (0.94, 4.04)	LOW

(a) Serious concerns over risk of bias due to self-report of outcomes
(b) Not applicable as only one study included
(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)

F.1.6.5 Proximity to traffic - Traffic intensity

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Bronchiolitis									
≥8640 cars/day ≤100 m, birth address									
Lindgren 2013	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	7898	aHR 0.7 (0.6, 0.9)	HIGH
≥8640 cars/day ≤100 m, birth address (never moved)									
Lindgren 2013	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	7898	aHR 0.7 (0.6, 0.9)	HIGH
Obstructive bronchitis									
≥8640 cars/day ≤100 m, birth address									
Lindgren 2013	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[e]	None	7898	aHR 1.0 (0.9,1.2)	MODERATE
≥8640 cars/day ≤100 m, birth address (never moved)									
Lindgren 2013	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[e]	None	7898	aHR 1.0 (0.8,1.2)	MODERATE
Asthma									
≥8640 cars/day ≤100 m, birth address									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Lindgren 2013	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	7898	aHR 0.7 (0.6, 0.9)	HIGH
≥8640 cars/day ≤100 m, birth address (never moved)									
Lindgren 2013	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	7898	aHR 0.7 (0.6, 0.9)	HIGH

(a) No concerns over risk of bias
(b) Not applicable as only one study included
(c) No concerns over directness
(d) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)
(e) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)

F.1.6.6 Located within 50 m of major traffic

Quality assessment							Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other**			
Wheeze									
Morgenstern 2007	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	none	3577	1.14 (0.92, 1.42)	LOW
Garshick 2003	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	none	2628	1.31 (1.00, 1.71)	MODERATE
Anxiety symptoms									
Power 2015	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	none	71 271	1.01 (0.95, 1.08)	MODERATE
Cough without infection									
Morgenstern 2007	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	none	3577	0.74 (0.55, 1.00)	LOW
Chronic cough									

Quality assessment							Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other			
Garshick 2003	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	none	2628	1.24 (0.92, 1.68)	LOW
Chronic phlegm									
Garshick 2003	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	none	2628	1.18 (0.88, 1.56)	LOW
Dry cough at night									
Morgenstern 2007	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	none	3577	0.84 (0.61, 1.16)	LOW
Asthmatic/spastic/ obstructive bronchitis									
Morgenstern 2007	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	none	3577	1.12 (0.88, 1.44)	LOW
Respiratory infections									
Morgenstern 2007	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	none	3577	1.03 (0.86, 1.23)	LOW
Sneezing, runny/stuffed nose									
Morgenstern 2007	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	none	3577	1.10 (0.87, 1.39)	LOW
Asthma									
Morgenstern 2008	prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	none	5921	1.66 (1.01, 2.59)	MODERATE
Sbihi 2016	prospective - cohort	Not serious[f]	NA[b]	Not serious[c]	Not serious[e]	none	68195	1.25 (1.04, 1.49)	HIGH
Asthma requiring hospitalisations									
Chang 2009	prospective - cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	none	3297	aHR 1.11 (0.92, 1.33)	MODERATE
Hay fever									
Morgenstern 2008	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	none	5921	1.16 (0.67, 2.00)	LOW
Eczema									

Quality assessment							Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other**			
Morgenstern 2008	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	none	5921	0.96 (0.72, 1.11)	LOW
Coronary Heart Disease (CHD) Mortality/sudden cardiac death									
Gan 2010	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Not serious[e]	none	450,283	aRR 1.29 (1.18, 1.41)	HIGH
Hart 2014	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Not serious[e]	none	107130	aHR 1.38 (1.04, 1.82)	HIGH
Obesity									
Li 2016	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	none	2372	1.10 (0.97; 1.25)	MODERATE
Lung cancer incidence									
Puett 2014	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Not serious[e]	none	103,650	aHR 2.01 (1.06, 3.80)	HIGH
Uterine leiomyomata									
Within 50 metres of an US A1- A3 roadway									
Mahalingaiah 2014	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	none	85251	1.01 (0.93, 1.09)	MODERATE

(a) Serious concerns over risk of bias due to self-report of outcomes
(b) Not applicable as only one study included
(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)
(e) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)
(f) No concerns over risk of bias

F.1.6.7 Located within 75 m of major traffic

Quality assessment							Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other**			
Asthma (lifetime)									

Quality assessment							Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other			
McConnell 2006	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	none	5341	1.29 (1.01, 1.66)	HIGH
Wheeze									
McConnell 2006	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	none	5341	1.40 (1.09, 1.78)	HIGH

(a) No concerns over risk of bias
(b) Not applicable as only one study included
(c) No concerns over directness
(d) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)

F.1.6.8 Located within 100 m of major traffic

Quality assessment							Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other			
Chronic lung allograft dysfunction (CLAD)									
Bhinder 2014	Retrospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[d]	none	397	aHR 4.72 (2.13, 10.47)	MODERATE
Coronary artery calcification (CAC)									
Hoffmann 2007	Prospective cohort	Not serious[e]	NA[b]	Not serious[c]	Not serious[d]	none	4494	1.45 (1.15, 1.82)	HIGH
Asthma									
Rice 2015	Prospective cohort	Serious[f]	NA[b]	Not serious[c]	Serious[g]	none	6,339	1.18 (0.95, 1.46)	LOW
Wheeze									
Rice 2015	Prospective cohort	Serious[f]	NA[b]	Not serious[c]	Serious[g]	none	6,339	1.02 (0.84, 1.25)	LOW
Chronic cough									

Quality assessment									
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Rice 2015	Prospective cohort	Serious[f]	NA[b]	Not serious[c]	Serious[g]	none	6,339	1.22 (0.89, 1.66)	LOW
Diabetes incidence									
Weinmayr 2015	Prospective cohort	Not serious[e]	NA[b]	Not serious[c]	Not serious[d]	none	3607	aRR 1.37 (1.04, 1.81)	HIGH
Preeclampsia									
Wesselink 2017	Retrospective cohort	Serious[f]	NA[b]	Not serious[c]	Serious[g]	none	3309	aRR 0.46 (0.16, 1.29)	LOW
Placental Abruption									
Wesselink 2017	Retrospective cohort	Serious[f]	NA[b]	Not serious[c]	Serious[g]	none	3309	aRR 1.75 (0.82, 3.76)	LOW
Small for gestational age (SGA)									
Wesselink 2017	Retrospective cohort	Serious[f]	NA[b]	Not serious[c]	Serious[g]	none	3309	aRR 0.91 (0.63, 1.31)	LOW
Stillbirth									
Wesselink 2017	Retrospective cohort	Serious[f]	NA[b]	Not serious[c]	Serious[g]	none	3309	aRR 1.71 (0.56, 5.23)	LOW
Incident hypertension									
Zhang 2016	Prospective cohort	Not serious[e]	NA[b]	Not serious[c]	Serious[g]	none	121,700	aHR 1.01 (0.88, 1.15)	MODERATE

(a) Serious concerns over risk of bias due to small sample size
(b) Not applicable as only one study included
(c) No concerns over directness
(d) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)
(e) No concerns over risk of bias
(f) Serious concerns over risk of bias due to self-report of outcomes
(g) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)

F.1.6.9 Located within 150 m of major traffic

Quality assessment									
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other**	**Number**	**Adjusted relative effect (aOR 95%CI unless stated)**	**Quality**
Wheezing in the last year									
Pujades-Rodriguez 2009	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	none	2644	0.86 (0.68, 1.08)	LOW
COPD									
Pujades-Rodriguez 2009	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	none	2644	0.97 (0.68, 1.37)	LOW
Bronchial hyper responsiveness									
Pujades-Rodriguez 2009	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	none	2644	0.92 (0.68, 1.24)	LOW
Allergic sensitisation									
Pujades-Rodriguez 2009	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	none	2644	0.87 (0.70, 1.07)	LOW
Asthma									
Sbihi 2016	Prospective cohort	Not serious[e]	NA[b]	Not serious[c]	Serious[d]	Pre-school age	68195	1.03 (0.98, 1.09)	MODERATE
Sbihi 2016	Prospective cohort	Not serious[e]	NA[b]	Not serious[c]	Serious[d]	School age	68195	1.04 (0.92, 1.16)	MODERATE

(a) Serious concerns over risk of bias due to self-report of outcomes
(b) Not applicable as only one study included
(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)
(e) No concerns over risk of bias

F.1.6.10 Located within 200 m of major traffic

Quality assessment							Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other			
Infertility									
Mahalingaiah 2016	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	none	36294	aHR 1.11 (1.02, 1.20)	HIGH
Asthma									
Bowatte 2017	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[e]	none	1405	1.21 (0.91, 1.59)	MODERATE
Wheeze									
Bowatte 2017	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	none	1405	1.38 (1.06, 1.80)	HIGH

(a) No concerns over risk of bias
(b) Not applicable as only one study included
(c) No concerns over directness
(d) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)
(e) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)

F.1.7 Individual characteristics and health outcomes

F.1.7.1 Tenancy status

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Cough									
Rented vs owner									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Engvall 2010	Retrospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	7640	1.85 (0.94, 3.65)	LOW
Eye irritation									
Rented vs owner									
Engvall 2010	Retrospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	7640	2.07 (1.19, 3.58)	MODERATE
Nasal irritation									
Rented vs owner									
Engvall 2010	Retrospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	7640	2.07 (1.33, 3.20)	MODERATE
Throat irritation									
Rented vs owner									
Engvall 2010	Retrospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	7640	1.98 (0.98, 3.97)	LOW

(a) Serious concerns over risk of bias due to self-report of outcomes
(b) Not applicable as only one study included
(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross line of no effect)
(e) No concerns as findings are statistically significant (95%CIs do not cross line of no effect)

F.1.7.2 Household occupant density

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Bronchiolitis									
Number of cohabitants ≥ 4									
Nenna 2017	Case control	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	416	1.75 (1.36; 2.13)	VERY LOW

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Newly diagnosed asthma									
Multi-family house									
Larsson 2010	Cohort	Not serious[e]	NA[b]	Not serious[c]	Serious[f]	None	2779	1.48 (0.86, 2.57)	MODERATE

(a) Very serious concerns over risk of bias due over self-report of exposure and outcomes
(b) Not applicable as only one study included
(c) No concerns over directness
(d) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)
(e) No concerns over risk of bias
(f) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)

F.1.7.3 Socio-economic status

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Cough									
Middle vs high socio-economic status									
Mommers 2005	Nested case control	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	1191	1.53 (1.12, 2.10)	VERY LOW
Low vs high socio-economic status									
Mommers 2005	Nested case control	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	1191	3.37 (2.01, 5.71)	VERY LOW

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Asthma									
Middle vs high socio-economic status – outcome reported as asthmatic symptoms									
Mommers 2005	Nested case control	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	1191	1.43 (1.00, 2.04)	VERY LOW
Middle vs high socio-economic status – outcome reported as asthmatic symptoms									
Mommers 2005	Nested case control	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	1191	3.32 (1.88, 5.93)	VERY LOW

(a) Serious concerns over risk of bias due over self-report of outcomes
(b) Not applicable as only one study included
(c) No concerns over directness
(d) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)

F.2 Association between level of exposure to pollutants and health outcomes

F.2.1 Dampness / Mould

F.2.1.1 Damp

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Cough									
Brunekreef 1989	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	4625	2.16 (1.64, 2.84)	LOW
Reported as slight to moderate dampness									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Cable 2014	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[e]	None	7320	aRR 0.85 (0.67, 1.09)	VERY LOW
Reported as marked dampness									
Cable 2014	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[e]	None	7320	aRR 1.26 (0.80, 1.99)	VERY LOW
Major moisture damage or any moisture damage with visible mould in child's main living area									
Karvonen 2015	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[e]	None	398	1.27 (0.77, 2.09)	MODERATE
Cough and phlegm									
Slight to moderate dampness									
Cable 2014	Prospective cohort	Very serious[a]	NA[b]	Not serious[e]	Not serious[d]	None	7320	1.24 (0.99, 1.56)	LOW
Marked dampness									
Cable 2014	Prospective cohort	Very serious[a]	NA[b]	Not serious[e]	Not serious[d]	None	7320	2.73 (1.88, 3.99)	LOW
Asthma									
Brunekreef 1989	Prospective cohort	Not serious[f]	NA[b]	Not serious[e]	Not serious[d]	None	4625	1.42 (1.04, 1.94)	HIGH
Casas 2012	Prospective cohort	Not serious[f]	NA[b]	Not serious[e]	Serious[e]	None	5078	1.16 (0.87, 1.53)	MODERATE
Zhou 2013	Prospective cohort	Not serious[f]	NA[b]	Not serious[e]	Not serious[d]	None	1765	2.19 (1.06, 4.53)	HIGH
Norback 2013	Prospective cohort	Not serious[f]	Do	Not serious[e]	Not serious[d]	None	7104	aRR 1.49 (1.00, 2.22)	HIGH
Reported as dampness and mould									
Dales 1991	Retrospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	14799	1.56 (1.25, 1.95)	LOW
Minor moisture damage with or without mould spots in child's main living area									
Karvonen 2015	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[e]	None	398	1.31 (0.72, 2.36)	MODERATE

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Major moisture damage or any moisture damage with visible mould in child's main living area									
Karvonen 2015	Prospective cohort	Not serious[g]	NA[b]	Not serious[c]	Serious[e]	None	398	1.33 (0.60, 2.98)	MODERATE
Airway hyper-responsiveness									
Hagmolen of Ten Have 2007	Prospective cohort	Very serious[a]	NA[b]	Not serious[e]	Not serious[d]	None	528	3.95 (1.82, 8.57)	LOW
Allergic rhinitis									
Water damage or mould/mildew in year									
Stark 2005	Prospective cohort	Not serious[e]	NA[b]	Not serious[e]	Serious[e]	None	405	1.66 (0.88, 3.15)	MODERATE
Acute respiratory infection requiring hospitalisation									
Infrequent dampness in the house									
Tin Tin 2016	Prospective cohort	Serious[g]	NA[b]	Not serious[c]	Serious[e]	None	6853	0.95 (0.82, 1.11)	LOW
Frequent dampness in the house									
Tin Tin 2016	Prospective cohort	Serious[g]	NA[b]	Not serious[c]	Serious[e]	None	6853	1.08 (0.91, 1.29)	LOW
Always dampness in the house									
Tin Tin 2016	Prospective cohort	Serious[g]	NA[b]	Not serious[c]	Serious[e]	None	6853	1.07 (0.84, 1.37)	LOW
Rhinitis									
Reported as mild damp stains									
Hagerhed-Engman 2009	Nested case control	Not serious[f]	NA[b]	Not serious[c]	Serious[e]	None	400	1.39 (0.73, 2.67)	LOW
Reported as severe damp stains									
Hagerhed-Engman 2009	Nested case control	Not serious[f]	NA[b]	Not serious[c]	Serious[e]	None	400	0.37 (0.04, 3.43)	LOW

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Reported as mild floor damp									
Hagerhed-Engman 2009	Nested case control	Not serious[f]	NA[b]	Not serious[c]	Serious[e]	None	400	1.16 (0.36, 3.76)	LOW
Reported as severe floor damp									
Hagerhed-Engman 2009	Nested case control	Not serious[f]	NA[b]	Not serious[c]	Serious[e]	None	400	1.58 (0.10, 26.14)	LOW
Bronchitis									
Brunekreef 1989	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	4625	1.32 (1.05, 1.67)	LOW
Bronchiolitis									
Zhou 2013	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[e]	None	1765	1.32 (0.80, 2.18)	MODERATE
Chest illness									
Brunekreef 1989	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	4625	1.52 (1.20, 1.93)	LOW
Chronic respiratory disease									
Reported as dampness and mould									
Dales 1991	Retrospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	14799	1.45 (1.29, 1.64)	LOW
Lower respiratory illness									
Brunekreef 1989	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	4625	1.68 (1.41, 2.01)	LOW
Reported as water damage or mould / mildew									
Stark 2003	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[e]	None	499	1.34 (0.99, 1.82)	MODERATE
Lower respiratory symptoms									
Reported as dampness and mould									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Dales 1991	Retrospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	14799	1.62 (1.48. 1.78)	LOW
Upper respiratory symptoms									
Reported as dampness and mould									
Dales 1991	Retrospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	14799	1.50 (1.38, 1.61)	LOW
Phlegm									
Reported as slight to moderate dampness									
Cable 2014	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[e]	None	7320	0.82 (0.54, 1.27)	VERY LOW
Reported as marked dampness									
Cable 2014	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	7320	2.05 (1.07, 3.91)	LOW
Any sleep problems									
Reported as dampness at home / visible mould									
Tiesler 2015	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	1719	1.80 (1.22, 2.66)	LOW
Problems falling asleep									
Reported as dampness at home / visible mould									
Tiesler 2015	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[e]	None	1719	1.50 (0.98, 2.30)	VERY LOW
Problems sleeping throughout night									
Reported as dampness at home / visible mould									
Tiesler 2015	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	1719	2.36 (1.15, 4.84)	LOW
Sleep<9 hours									
Reported as dampness at home / visible mould									
Tiesler 2015	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	1719	1.60 (1.02, 2.51)	LOW

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Wheeze									
Brunekreef 1989	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Not serious[d]	None	4625	1.23 (1.10, 1.39)	HIGH
Casas 2012	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[e]	None	5078	1.11 (0.87, 1.43)	MODERATE
Zhou 2013	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	1765	2.12 (1.30, 3.46)	HIGH
Reported as damp / mould									
Jedrychowski 2010	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Not serious[d]	None	369	IRR 1.67 (1.39, 2.01)	MODERATE
Reported as damp / mould									
Jedrychowski 2011	Prospective cohort	Serious[h]	NA[b]	Not serious[c]	Not serious[d]	None	322	aHR 1.22 (1.07, 1.40)	MODERATE
Eye irritation									
Reported as dampness and mould									
Dales 1991	Retrospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	14799	1.63 (1.46, 1.82)	LOW
Non-chest illness									
Brunekreef 1989	Prospective cohort	Very serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	4625	1.55 (1.25, 1.93)	LOW

(a) Very serious concerns over risk of bias due over self-report of exposure and outcomes
(b) Not applicable as only one study included
(c) No concerns over directness
(d) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)
(e) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)
(f) No concerns over risk of bias
(g) Serious concerns over risk of bias due to self-report of exposure

F.2.1.2 Mould

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Cough									
Belanger 2003	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	593	1.53 (1.01, 2.30)	HIGH
Brunekreef 1989	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	4625	2.12 (1.64, 2.73)	HIGH
Engvall 2001	Retrospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	9808	3.30 (3.16, 3.46	HIGH
At risk children									
Belanger 2003	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	256[g]	1.91 (1.07, 3.42)	HIGH
Asthma									
McConnell 2002	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[e]	None	3535	aRR 1.10 (0.80, 1.60)	MODERATE
Brunekreef 1989	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[e]	None	4625	1.27 (0.93, 1.74)	MODERATE
Norback 2013	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[e]	None	7104	aRR 1.15 (0.71, 1.85)	MODERATE
Reported as mould odour									
Jaakkola 2005	Prospective cohort	Very serious[f]	NA[b]	Not serious[c]	Not serious[d]	None	1916	2.44 (1.07, 5.60)	LOW
Reported as visible mould									
Jaakkola 2005	Prospective cohort	Very serious[f]	NA[b]	Not serious[c]	Serious[e]	None	1916	0.65 (0.24, 1.72)	VERY LOW
Any indicator of mould or damp (1 of Mould odour, visible mould, or dampness damage)									
Thacher 2017	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[e]	None	3798	1.16 (0.93, 1.44)	MODERATE

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
2 indicators of mould or damp (2 of Mould odour, visible mould, or dampness damage)									
Thacher 2017	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	3798	1.37 (1.01, 1.86)	HIGH
3 indicators of mould or damp (3 of Mould odour, visible mould, or dampness damage)									
Thacher 2017	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	3798	1.73 (1.10, 2.74)	HIGH
Asthma (children with wheeze at baseline)									
McConnell 2002	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	3535	0.60 (0.40, 0.90)	HIGH
Allergic rhinoconjunctivitis									
Reported as mould on walls									
Ibargoyen-Roteta 2007	Prospective cohort	Very serious[f]	NA[b]	Not serious[e]	Serious[e]	None	3360	1.34 (0.64, 2.79)	VERY LOW
Allergic rhinitis									
Reported as mould on walls									
Jaakkola 2010	Prospective cohort	Very serious[f]	NA[b]	Not serious[c]	Not serious[d]	None	1863	1.73 (1.27, 2.38)	LOW
Reported as visible mould									
Jaakkola 2010	Prospective cohort	Very serious[f]	NA[b]	Not serious[c]	Not serious[d]	None	1863	1.98 (1.32, 2.99)	LOW
Acute respiratory infection									
Mould or mildew in the walls or ceilings in the room where child sleeps at night in the past two weeks									
Tin Tin 2016	Prospective cohort	Serious[g]	NA[b]	Not serious[c]	Not serious[d]	None	6853	0.81 (0.67, 0.99)	MODERATE
Rhinitis									
Any indicator of mould or damp (1 of Mould odour, visible mould, or dampness damage)									
Thacher 2017	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[e]	None	3798	1.03 (0.87, 1.22)	MODERATE
2 indicators of mould or damp (2 of Mould odour, visible mould, or dampness damage)									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Thacher 2017	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[e]	None	3798	1.18 (0.92, 1.52)	MODERATE
3 indicators of mould or damp (3 of Mould odour, visible mould, or dampness damage)									
Thacher 2017	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[e]	None	3798	1.23 (0.82, 1.85)	MODERATE
Bronchitis									
Brunekreef 1989	Prospective cohort	Very serious[f]	NA[b]	Not serious[c]	Not serious[d]	None	4625	1.48 (1.17, 1.87)	LOW
Chest illness									
Brunekreef 1989	Prospective cohort	Very serious[f]	NA[b]	Not serious[c]	Not serious[d]	None	4625	1.40 (1.11, 1.78)	LOW
Otitis media									
Pettigrew 2004	Prospective cohort	Serious[g]	NA[b]	Not serious[c]	Serious[e]	None	1002	1.37 (0.94, 2.02)	LOW
Hay fever									
Brunekreef 1989	Prospective cohort	Very serious[f]	NA[b]	Not serious[c]	Not serious[d]	None	4625	1.57 (1.31, 1.74)	LOW
Lower respiratory illness									
Brunekreef 1989	Prospective cohort	Very serious[f]	NA[b]	Not serious[c]	Not serious[d]	None	4625	1.57 (1.31, 1.87)	LOW
Nasal symptoms									
Reported as mouldy odour									
Engvall 2001	Retrospective cohort	Very serious[f]	NA[b]	Not serious[c]	Not serious[d]	None	9808	2.83 (2.73, 2.93)	LOW
Throat symptoms									
Reported as mouldy odour									
Engvall 2001	Retrospective cohort	Very serious[f]	NA[b]	Not serious[c]	Not serious[d]	None	9808	3.48 (3.33, 3.62)	LOW
Facial skin symptoms									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Reported as mould odour									
Engvall 2001	Retrospective cohort	Very serious[f]	NA[b]	Not serious[c]	Not serious[d]	None	9808	2.93 (2.80, 3.06)	LOW
Headache									
Reported as mouldy odour									
Engvall 2001	Retrospective cohort	Very serious[f]	NA[b]	Not serious[c]	Not serious[d]	None	9808	3.37 (3.24, 3.51)	LOW
Any sleep problems									
Tiesler 2015	Prospective cohort	Very serious[f]	NA[b]	Not serious[c]	Not serious[d]	None	1719	1.70 (1.13, 2.54)	LOW
Problems falling asleep									
Reported as visible mould									
Tiesler 2015	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[e]	None	1719	1.50 (0.97, 2.33)	LOW
Problems sleeping throughout night									
Reported as visible mould									
Tiesler 2015	Prospective cohort	Very serious[f]	NA[b]	Not serious[c]	Serious[e]	None	1719	1.91 (0.89, 4.13)	VERY LOW
Sleep<9 hours									
Reported as visible mould									
Tiesler 2015	Prospective cohort	Very serious[f]	NA[b]	Not serious[c]	Not serious[d]	None	1719	1.67 (1.06, 2.65)	LOW
Tiredness									
Reported as mouldy odour									
Engvall 2001	Retrospective cohort	Very serious[f]	NA[b]	Not serious[c]	Not serious[d]	None	9808	2.38 (2.31, 2.46)	LOW
Wheeze									
Reported as mould / mildew									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Belanger 2003	Prospective cohort	Very serious[f]	NA[b]	Not serious[c]	Serious[e]	None	593	1.22 (0.80, 1.88)	VERY LOW
Brunekreef 1989	Prospective cohort	Very serious[f]	NA[b]	Not serious[c]	Not serious[d]	None	4625	1.79 (1.44, 2.32)	LOW
Karvonen 2015	Prospective cohort	Very serious[f]	NA[b]	Not serious[c]	Not serious[d]	None	398	1.34 (0.90, 2.01)	LOW
Reported as mould / mildew (in at risk children)									
Belanger 2003	Prospective cohort	Serious[g]	NA[b]	Not serious[c]	Not serious[d]	None	256	2.51 (1.37, 4.62)	MODERATE
Reported as visible mould (low vs none) in children with atopy									
Iossifova 2009	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[e]	None	483	1.86 (0.86, 4.00)	MODERATE
Reported as visible mould (high vs none) in children with atopy									
Iossifova 2009	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	483	6.16 (1.38, 27.44)	HIGH
Eczema									
Reported as mild mould									
Hagerhed-Engman 2009	Nested case control	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	400	1.86 (1.04, 3.30)	MODERATE
Reported as severe mould									
Hagerhed-Engman 2009	Nested case control	Not serious[a]	NA[b]	Not serious[c]	Serious[e]	None	400	1.93 (0.91, 4.12)	LOW
Eye irritation									
Reported as mouldy odour									
Engvall 2001	Retrospective cohort	Very serious[f]	NA[b]	Not serious[c]	Not serious[d]	None	9808	3.75 (3.60, 3.92)	LOW
Non-chest illness									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Brunekreef 1989	Prospective cohort	Very serious[f]	NA[b]	Not serious[c]	Not serious[d]	None	4625	1.40 (1.13, 1.74)	LOW
Otitis media									
Any episode									
Pettigrew 2004 b	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[e]	None	813	1.15 (0.67, 1.99)	MODERATE
Otitis media, Recurrent (4 or more episodes of otitis media (separated by at least 21 days) in one year)									
Pettigrew 2004 b	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[e]	None	813	1.05 (0.88, 1.26)	MDOERATE

(a) No concerns over risk of bias
(b) Not applicable as only one study included
(c) No concerns over directness
(d) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)
(e) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)
(f) Very serious concerns over risk of bias due over self-report of exposure and outcomes
(g) Serious concerns over risk of bias due to self-report of outcomes

F.2.1.3 Fungal spore levels

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Cough in children with asthma									
Cladosporium >148 CFU/m^3									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Gent 2012	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	1233	0.98 (0.54, 1.80)	LOW
Asthma severity in children with asthma									
Cladosporium >148 CFU/m^3									
Gent 2012	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	1233	1.58 (0.88, 2.83)	LOW
Rescue medication use in children with asthma									
Cladosporium >148 colony forming units (CFU) /m^3									
Gent 2012	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	1233	0.69 (0.37, 1.29)	LOW
Lower respiratory illness in infants at risk of asthma									
> 90th percentile for specific taxon									
Stark 2003	Prospective cohort	Not serious[e]	NA[b]	Not serious[c]	Not serious[f]	None	499	1.86 (1.21, 2.88)	HIGH
Wheeze in children with asthma									
Cladosporium >148 CFU/m^3									
Gent 2012	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	1233	1.22 (0.66, 2.26)	LOW
Otitis media in 1st 6 months of life in infants at risk of asthma									
Penicillium ≥1000 CFU/m^3									
Pettigrew 2004 (US)	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	1002	1.27 (0.56, 2.86)	LOW
Cladosporium ≥1000 CFU/m^3									
Pettigrew 2004 (US)	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	1002	1.09 (0.52, 2.29)	LOW
Other mould (not yeast, penicillium or cladosporium) ≥1000 CFU/m^3									
Pettigrew 2004 (US)	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[f]	None	1002	3.45 (1.36, 8.76)	MODERATE

1 *(a) Serious concerns over risk of bias due over self-report of outcomes*

(b) Not applicable as only one study included
(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)
(e) No concerns over risk of bias
(f) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)

F.2.2 Formaldehyde

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Wheezing in infants at risk of asthma									
Formaldehyde between 12.4 and 16.3 μg/m³ compared to < 12.4 in infants at risk of asthma									
Raaschou-Nielsen 2010	Retrospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	9808	1.11 (0.47, 2.63)	VERY LOW
Formaldehyde between 16.3 and 20.3 μg/m³ compared to < 12.4 in infants at risk of asthma									
Raaschou-Nielsen 2010	Retrospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	9808	1.21 (0.51, 2.92)	VERY LOW
Formaldehyde between 20.3 and 25.6 μg/m³ compared to < 12.4 in infants at risk of asthma									
Raaschou-Nielsen 2010	Retrospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	9808	1.40 (0.57, 3.47)	VERY LOW
Formaldehyde > 25.6 μg/m³ compared to < 12.4 in infants at risk of asthma									
Raaschou-Nielsen 2010	Retrospective cohort	Very serious[a]	NA[b]	Not serious[c]	Serious[d]	None	9808	0.67 (0.29, 1.54)	VERY LOW
Lower respiratory tract infections									
per inter-quartile range increase									
Roda 2011	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Not serious[f]	None	2940	1.32 (1.11, 1.55)	MODERATE

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Lower respiratory tract infection with wheeze									
per inter-quartile range increase									
Roda 2011	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Not serious[f]	None	Not reported	1.41 (1.14, 1.74)	MODERATE

(a) Very serious concerns over risk of bias due over self-report of exposure and outcomes
(b) Not applicable as only one study included
(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)
(e) Serious concerns over risk of bias due to self-report of outcomes
(f) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)

F.2.3 Allergens

F.2.3.1 House dust mite allergens (Der p 1 + Der f 1)

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Asthma exacerbations									
House dust mite (HDM) > 10µg/g									
Gent 2012	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	1233	1.19 (0.92, 1.55)	LOW

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Asthma ≤ 6 years of age									
Casas 2015	Prospective cohort	Not serious[e]	NA[b]	Not serious[c]	Serious[d]	≥0.19 µg/g to <0.4 µg/g	4334	1.6 (0.9, 2.6)	MODERATE
Casas 2015	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[f]	0.4 to <2 µg/g	4334	1.4 (1.1, 1.9)	HIGH
Casas 2015	Prospective cohort	Not serious[e]	NA[b]	Not serious[c]	Serious[d]	≥2 µg/g	4334	1.1 (0.8, 1.6)	MODERATE
Asthma > 6 years of age									
Casas 2015	Prospective cohort	Not serious[e]	NA[b]	Not serious[c]	Serious[d]	≥0.19 µg/g to <0.4 µg/g	4334	1.3 (0.8, 2.3)	MODERATE
Casas 2015	Prospective cohort	Not serious[e]	NA[b]	Not serious[c]	Serious[d]	0.4 to <2 µg/g	4334	1.1 (0.8, 1.6)	MODERATE
Casas 2015	Prospective cohort	Not serious[e]	NA[b]	Not serious[c]	Serious[d]	≥2 µg/g	4334	1.0 (0.7, 1.4)	MODERATE
Wheeze									
HDM									
Herr 2012	Prospective cohort	Not serious[e]	NA[b]	Not serious[c]	Not serious[f]	None	1879	1.39 (1.12, 1.73)	HIGH
HDM 0.981 - 240µg/g									
Lau 2000	Prospective cohort	Not serious[e]	NA[b]	Not serious[c]	Serious[d]	None	1314	1.03 (0.52, 2.04)	MODERATE
Reported as persistent wheeze									
Casas 2015	Prospective cohort	Not serious[e]	NA[b]	Not serious[c]	Serious[d]	≥0.19 µg/g to <0.4 µg/g	4334	1.3 (0.8, 2.2)	MODERATE
Casas 2015	Prospective cohort	Not serious[e]	NA[b]	Not serious[c]	Serious[d]	0.4 to <2 µg/g	4334	1.1 (0.8, 1.5)	MODERATE
Casas 2015	Prospective cohort	Not serious[e]	NA[b]	Not serious[c]	Serious[d]	≥2 µg/g	4334	0.9 (0.7, 1.3)	MODERATE
HDM (Der p 1 + Der f 1) ≥ 2 µg/g (for at risk infants)									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Belanger 2003	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	256	1.04 (0.60, 1.80)	LOW
Dust mite (Der p 1 + Der f 1) ≥ 2 µg/g (for not at risk infants)									
Belanger 2003	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	593	0.78 (0.55, 1.13)	LOW
Cough									
HDM (Der p 1 + Der f 1) ≥ 2 µg/g (for at risk infants)									
Belanger 2003	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	256	1.27 (0.75, 2.15)	LOW
HDM (Der p 1 + Der f 1) ≥ 2 µg/g (for not at risk infants)									
Belanger 2003	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	593	0.76 (0.54, 1.07)	LOW

(a) Serious concerns over risk of bias due over self-report of outcomes
(b) Not applicable as only one study included
(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)
(e) No concerns over risk of bias
(f) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)

F.2.3.2 House dust mite allergens (Der p 1)

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Asthma exacerbations									
Der p 1 >0.10 µg/g (reported as Asthma Severity Index)									
Gent 2012	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	1233	1.19 (0.92, 1.55)	LOW

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Der p 1 >0.10 µg/g (reported as rescue medication use)									
Gent 2012	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	1233	1.47 (1.11, 1.94)	MODERATE
Der p 1 (µg/g) 0.10 to <2.0 vs <0.10 in main living area (reported as Moderate/severe GINA score)									
Gent 2009	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	None	300	0.93 (0.41, 2.10)	MODERATE
Der p 1 (µg/g) 0.10 to <2.0 vs <0.10 in main living area (reported as Controller meds≥9 months)									
Gent 2009	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	None	300	0.61 (0.27,1.35)	MODERATE
Der p 1 (µg/g) 2.0 to <10.0 vs <0.10 in main living area (reported as Moderate/severe GINA score)									
Gent 2009	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Not serious[e]	None	300	2.93 (1.37, 6.30)	HIGH
Der p 1 (µg/g) 2.0 to <10.0 vs <0.10 in main living area (reported as Controller meds≥9 months)									
Gent 2009	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Not serious[e]	None	300	2.52 (1.17,5.42)	HIGH
Der p 1 (µg/g) ≥10.0 vs <0.10 in main living area (reported as Moderate/severe GINA score)									
Gent 2009	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Not serious[e]	None	300	2.55 (1.13, 5.73)	HIGH
Der p 1 (µg/g) ≥10.0 to <2.0 vs <0.10 in main living area (reported as Controller meds≥9 months)									
Gent 2009	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	None	300	2.17 (0.97,4.86)	MODERATE
Der p 1 (µg/g) 0.10 to <2.0 vs <0.10 in bed (reported as Moderate/severe GINA score)									
Gent 2009	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	None	300	0.99 (0.47, 2.08)	MODERATE
Der p 1 (µg/g) 0.10 to <2.0 vs <0.10 in bed (reported as Controller meds≥9 months)									
Gent 2098	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	None	300	1.35 (0.66,2.73)	MODERATE
Der p 1 (µg/g) 2.0 to <10.0 vs <0.10 in bed (reported as Moderate/severe GINA score)									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Gent 2009	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Not serious[e]	None	300	2.73 (1.32,5.64)	HIGH
Der p 1 (µg/g) 2.0 to <10.0 vs <0.10 in bed (reported as Controller meds≥9 months)									
Gent 2009	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Not serious[e]	None	300	2.16 (1.04,4.48)	HIGH
Der p 1 (µg/g) ≥10.0 vs <0.10 in bed (reported as Moderate/severe GINA score)									
Gent 2009	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	None	300	1.19 (0.46,3.08)	MODERATE
Der p 1 (µg/g) ≥10.0 to <2.0 vs <0.10 in bed (reported as Controller meds≥9 months)									
Gent 2009	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	None	300	1.41 (0.57,3.46)	MODERATE
Asthma									
Der p 1 for asthma at ≤ 6 years									
Casas 2015	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	≥1.9 µg/g to <0.4 µg/g	4334	1.4 (0.9, 2.3)	MODERATE
Casas 2015	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	0.4 to <2 µg/g	4334	1.1 (0.8, 1.6)	MODERATE
Casas 2015	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	≥2 µg/g	4334	1.0 (0.7, 1.5)	MODERATE
asthma at > 6 years									
Casas 2015	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	≥1.9 µg/g to <0.4 µg/g	4334	1.1 (0.6, 1.8)	MODERATE
Casas 2015	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	0.4 to <2 µg/g	4334	1.1 (0.8, 1.6)	MODERATE
Casas 2015	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	≥2 µg/g	4334	0.7 (0.4, 1.0)	MODERATE
Der p1 0.83–6.46 µg/g									
Torrent 2007	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	None	1611	0.67 (0.40, 1.12)	MODERATE
Der p1 >6.46 µg/g									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Torrent 2007	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	None	1611	0.68 (0.37, 1.25)	MODERATE
Wheeze									
Der p 1 >0.10 µg/g									
Gent 2012	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	1233	1.26 (0.95, 1.67)	LOW
Der p 1 for persistent wheeze									
Casas 2015	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	≥0.12 to <0.4 µg/g	4334	1.1 (0.7, 1.8)	MODERATE
Casas 2015	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	> 0.4 to <2 µg/g	4334	0.9 (0.7, 1.3)	MODERATE
Casas 2015	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	≥2 µg/g	4334	0.8 (0.5, 1.1)	MODERATE
Der p 1 (µg/g) 0.10 to <2.0 vs <0.10 in main living area									
Gent 2009	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	None	300	1.05 (0.38,2.84)	MODERATE
Der p 1 (µg/g) 2.0 to <10.0 vs <0.10 in main living area									
Gent 2009	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	None	300	1.55 (0.62,3.85)	MODERATE
Der p 1 (µg/g) ≥10.0 vs <0.10 in main living area									
Gent 2009	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	None	300	2.01 (0.78,5.19)	MODERATE
Der p 1 (µg/g) 0.10 to <2.0 vs <0.10 in bed									
Gent 2009	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	None	300	1.70 (0.68,4.22)	MODERATE
Der p 1 (µg/g) 2.0 to <10.0 vs <0.10 in bed									
Gent 2009	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	None	300	1.60 (0.64,4.00)	MODERATE
Der p 1 (µg/g) ≥10.0 vs <0.10 in bed									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Gent 2009	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Not serious[e]	None	300	3.58 (1.28, 9.97)	HIGH
Cough									
HDM Der p 1 >0.10 µg/g									
Gent 2012	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	1233	1.18 (0.90, 1.55)	LOW
Eczema									
HDM allergen quintiles compared to lowest quintile (0·02–0·27)									
Harris 2007	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	Quintile 2 (0·28 –0·81)	593	1.01 (0.53, 1.92)	MODERATE
Harris 2007	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	Quintile 3 (0·82–2·22)	593	1.37 (0.74, 2.55)	MODERATE
Harris 2007	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	(Quintile 4 (2·23–7·75)	593	0.66 (0.34, 1.29)	MODERATE
Harris 2007	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	Quintile 5 (7·76–384·97)	593	0.71 (0.37, 1.37)	MODERATE
Visible flexural dermatitis									
House dust mite allergen quintiles compared to lowest quintile (0·02–0·27)									
Harris 2007	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	Quintile 2 (0·28–0·81)	593	1.17 (0.58, 2.34)	MODERATE
Harris 2007	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	Quintile 3 (0·82–2·22)	593	1.73 (0.87, 3.46)	MODERATE
Harris 2007	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	Quintile 4 (2·23–7·75)	593	0.88 (0.43, 1.81)	MODERATE
Harris 2007	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	Quintile 5 (7·76–384·97)	593	0.96 (0.47, 1.94)	MODERATE

(a) Serious due to concerns over self-report of exposure
(b) Not applicable as only one study included
(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)
(e) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)

(f) No concerns over risk of bias

F.2.3.3 House dust mite allergens (Der f 1)

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Asthma exacerbations									
Der f 1 >2.1 µg/g (reported as rescue medication use)									
Gent 2012	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	1233	1.09 (0.78, 1.51)	LOW
Der f 1 >2.1 µg/g (reported as Asthma Severity Index)									
Gent 2012	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Serious[d]	None	1233	1.28 (0.94, 1.74)	LOW
Asthma									
Der f 1 for asthma at ≤ 6 years									
Casas 2015	Prospective cohort	Not serious[e]	NA[b]	Not serious[c]	Serious[d]	≥0.07 to <0.4 µg/g	4334	1.2 (0.8, 1.8)	MODERATE
Casas 2015	Prospective cohort	Not serious[e]	NA[b]	Not serious[c]	Serious[d]	0.4 to <2 µg/g	4334	1.2 (0.8, 1.6)	MODERATE
Casas 2015	Prospective cohort	Not serious[e]	NA[b]	Not serious[c]	Serious[d]	≥2 µg/g	4334	1.2 (0.8, 1.8)	MODERATE
Der f 1 for asthma at > 6 years									
Casas 2015	Prospective cohort	Not serious[e]	NA[b]	Not serious[c]	Serious[d]	≥Low to <0.4 µg/g	4334	1.0 (0.7, 1.6)	MODERATE
Casas 2015	Prospective cohort	Not serious[e]	NA[b]	Not serious[c]	Serious[d]	0.4 to <2 µg/g	4334	1.0 (0.7, 1.4)	MODERATE
Casas 2015	Prospective cohort	Not serious[e]	NA[b]	Not serious[c]	Serious[d]	≥2 µg/g	4334	1.1 (0.7, 1.6)	MODERATE
Der f 1 exposure at 3 months for asthma at 7 years in children at risk of asthma (per interquartile increase in exposure)									
O'Connor 2017	Prospective cohort	Not serious[e]	NA[b]	Not serious[c]	Serious[d]	None	442	0.98 (0.91, 1.04)	MODERATE

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Wheeze									
Der f 1 per 1-log increase in allergen level in first year of life for wheeze at 3 years in children at risk of asthma									
Lynch 2014	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	560	0.92 (0.73, 1.15)	LOW
Der f 1 for persistent wheeze									
Casas 2015	Prospective cohort	Not serious[e]	NA[b]	Not serious[c]	Serious[d]	≥0.07 to <0.4 µg/g	4334	1.2 (0.8, 1.8)	MODERATE
Casas 2015	Prospective cohort	Not serious[e]	NA[b]	Not serious[c]	Serious[d]	0.4 to <2 µg/g	4334	1.1 (0.8, 1.5)	MODERATE
Casas 2015	Prospective cohort	Not serious[e]	NA[b]	Not serious[c]	Serious[d]	≥2 µg/g	4334	1.1 (0.8, 1.6)	MODERATE
Der f 1 >2.1 µg/g									
Gent 2012	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	1233	0.89 (0.63, 1.24)	LOW
Cough									
Der f 1 >2.1 µg/g									
Gent 2012	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	1233	0.90 (0.65, 1.25)	LOW

(a) Serious concerns over risk of bias due to self-report of exposure
(b) Not applicable as only one study included
(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)
(e) No concerns over risk of bias

F.2.3.4 1 Cat allergens (Fel d 1)

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Asthma									
Fel d 1 ≥2 µg/gm									
Carlsten 2010	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	380	3.33 (1.72, 6.45)	HIGH
Fel d 1 >0.12 µg/g (asthma reported as Asthma Severity Index)									
Gent 2012	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Serious[f]	None	1233	1.14 (0.88, 1.47)	LOW
Fel d 1 >0.12 µg/g (asthma reported as rescue medication use)									
Gent 2012	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Not serious[d]	None	1233	1.32 (1.01, 1.74)	MODERATE
Fel d 1 0.216 – 47µg/g									
Lau 2000	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[f]	None	1314	1.52 (0.64, 2.62)	MODERATE
Wheeze									
Fel d 1 >1 µg/g in infants at risk of asthma or atopy									
Belanger 2003	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Serious[f]	None	256	0.64 (0.36, 1.12)	LOW
Litonjua 2002	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[f]	None	226	0.61 (0.27, 1.35)	MODERATE
Lau 2000	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[f]	None	1314	1.47 (0.72, 1.26)	MODERATE
Fel d 1 per 1-log increase in allergen level in first year for wheeze at 3 years at risk of asthma									
Lynch 2002	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Serious[f]	None	560	0.71 (0.58, 0.88)	LOW
Fel d 1 >1 µg/g in infants not at risk of asthma									
Belanger 2003	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Serious[f]	None	593	0.84 (0.57, 1.24)	LOW
Children with asthma									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Gent 2012	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Not serious[d]	None	1233	1.39 (1.05, 1.84)	MODERATE
Fel d 1 exposure at 3 months for asthma at 7 years in children at risk of asthma (per interquartile increase in exposure)									
O'Connor 2017	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	442	0.78 (0.62, 0.98)	HIGH
Cough									
Infants at risk of asthma									
Belanger 2003	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Serious[f]	None	256	1.13 (0.66, 1.94)	LOW
Infants not at risk of asthma									
Belanger 2003	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Serious[f]	None	593	0.81 (0.56, 1.17)	LOW
Children with asthma									
Gent 2012	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Not serious[d]	Fel d 1 >0.12 µg/g	1233	0.89 (0.68, 1.17)	MODERATE
Asthma									
Cat allergen (per 10 mg increase)									
Bertelsen 2010	Prospective cohort	Not serious[g]	NA[b]	Not serious[c]	Not serious[d]	None	260	1.20 (1.01, 1.43),	HIGH
Bronchial hyperresponsiveness									
Cat allergen (per 10 mg increase)									
Bertelsen 2010	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	260	1.22 (1.02, 1.46)	HIGH
Eczema									
Cat allergen exposure – quintiles compared to lowest quintile (0·01–0·44)									
Harris 2007	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	Quintile 2 (0·45–1·04)	593	1.42 (0.72, 2.81)	MODERATE
Harris 2007	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	Quintile 3 (1·05–3·33)	593	1.41 (0.71, 2.79)	MODERATE

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Harris 2007	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	Quintile 4 (3·34–44·72))	593	1.31 (0.65, 2.62)	MODERATE
Harris 2007	Prospective cohort	Not serious[g]	NA[b]	Not serious[c]	Serious[d]	Quintile 5 (44·73–14151·32)	593	1.41 (0.72, 2.75)	MODERATE
Visible flexural dermatitis									
Cat allergen exposure – quintiles compared to lowest quintile (0·01–0·44)									
Harris 2007	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	Quintile 2 (0·28–0·81)	593	1.28 (0.64, 2.56)	MODERATE
Harris 2007	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	Quintile 3 (0·82–2·22)	593	0.75 (0.36, 1.55)	MODERATE
Harris 2007	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	Quintile 4 (2·23–7·75)	593	1.18 (0.59, 2.38)	MODERATE
Harris 2007	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	Quintile 5 (7·76–384·97)	593	0.96 (0.48, 1.91)	MODERATE

(a) No concerns over risk of bias
(b) Not applicable as only one study included
(c) No concerns over directness
(d) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)
(e) Serious due to concerns over self-report of exposure
(f) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)

F.2.3.5 Dog allergens (Can f 1)

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Asthma									
Can f 1 ≥ 2 µg/gm									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Carlsten 2010	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	380	3.84 (1.79, 8.22)	HIGH
Can f 1 >1.2 µg/g (asthma reported as Asthma Severity Index)									
Gent 2012	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Serious[f]	None	1233	1.15 (0.83, 1.58)	LOW
Can f 1 >1.2 µg/g (asthma reported as rescue medication use)									
Gent 2012	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Serious[f]	None	1233	1.15 (0.82, 1.62)	LOW
Can d 1 exposure at 3 months for asthma at 7 years in children at risk of asthma (per interquartile increase in exposure)									
O'Connor 2017	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[f]	None	442	0.62 (0.37, 1.03)	MODERATE
Cough									
Dog allergen (Can f 1) ≥1.8µg/g (for at risk infants)									
Belanger 2003	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Serious[f]	None	256	0.91 (0.53, 1.56)	LOW
Dog allergen (Can f 1) ≥1 for 8µg/g (for not at risk infants)									
Belanger 2003	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Serious[f]	None	593	1.11 (0.78, 1.58)	LOW
Can f 1 >1.2 µg/g									
Gent 2012	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Serious[f]	None	1233	1.11 (0.80, 1.56)	LOW
Wheeze									
Can f 1 per 1-log increase in allergen level in first year for wheeze at 3 years at risk of asthma									
Lynch 2002	Prospective cohort	Serious[e]	NA[b]	Not serious[c]	Serious[f]	None	560	1.00 (0.79, 1.28)	LOW

(a) No concerns over risk of bias
(b) Not applicable as only one study included
(c) No concerns over directness
(d) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)
(e) Serious due to concerns over self-report of exposure
(f) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)

F.2.4 NO_2

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Asthma exacerbations									
Belanger 2013	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	6.02 ppb to 8.88 ppb	1342	1.15 (0.94, 1.42)	LOW
Belanger 2013	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	>8.88 ppb to 14.30 ppb	1342	1.31 (1.04, 1.66)	MODERATE
Belanger 2013	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	> 14.30 ppb	1342	1.43 (1.08, 1.88)	MODERATE
NO_2 exposure at 12 months for asthma at 7 years in children at risk of asthma (per interquartile increase in exposure)									
O'Connor 2017	Prospective cohort	Not serious[a]	NA[b]	Not serious[c]	Serious[d]	None	442	0.97 (0.75, 1.26)	MODERATE
Wheeze									
Belanger 2013[a]	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	6.02 - 8.88 ppb	1342	1.15 (0.90, 1.45)	LOW
Belanger 2013[a]	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	8.89- 14.30 ppb	1342	1.44 (1.11, 1.86)	MODERATE
Belanger 2013[a]	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	> 14.30 ppb	1342	1.53 (1.16, 2.02)	MODERATE
NO_2 5.2 to 6.8 μg/m^3 compared to < 5.2 in infants at risk of asthma									
Raaschou-Nielsen 2010	Cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	None	411	0.66 (0.27, 1.61)	MODERATE
NO_2 6.8 to 8.6 μg/m^3 compared to < 5.2 in infants at risk of asthma									
Raaschou-Nielsen 2010	Cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	None	411	0.80 (0.32, 2.01)	MODERATE

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
NO_2 8.6 to 11.7 µg/m^3 compared to < 5.2 in infants at risk of asthma									
Raaschou-Nielsen 2010	Cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	None	411	1.15 (0.40, 3.32)	MODERATE
NO_2 > 11.7 µg/m^3 compared to < 5.2 in infants at risk of asthma									
Raaschou-Nielsen 2010	Cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	None	411	0.43 (0.15, 1.18)	MODERATE
NO_2 (per 20ppb increase in multi-family home)									
Belanger 2006	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Not serious[e]	None	242	1.52 (1.04, 2.21)	HIGH
NO_2 (per 20ppb increase in single family home)									
Belanger 2006	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	None	486	0.99 (0.71, 1.38)	MODERATE
Cough									
> 10 ppb (outcome reported as persistent cough)									
Belanger 2003	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	593[g]	1.21 (1.05, 1.40)	MODERATE

(a) Serious concerns over risk of bias due over self-report of outcomes
(b) Not applicable as only one study included
(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)
(e) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)
(f) No concerns over risk of bias

F.2.5 PAH

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Wheeze									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Cord blood PAH-adducts – wheeze at 1 – 2 years of age									
Jedrychowski 2010	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	369	1.69 (1.52, 1.88)	MODERATE
Cord blood PAH-adducts – wheeze at 3 – 4 years of age									
Jedrychowski 2010	Cohort	Serious[a]	NA[b]	Not serious[c]	Serious[e]	None	369	0.96 (0.84, 1.09)	LOW
per log unit of PAH concentration in ng/m^3) for wheezing or whistling in the chest irrespective of respiratory infection,									
Jedrychowski 2005	Cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	333	3.83 (1.18, 12.43)	MODERATE
per log unit of PAH concentration in ng/m^3) for wheezing without cold									
Jedrychowski 2005	Cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	333	1.96 (1.38, 2.78)	MODERATE
Prenatal PAH exposure									
Jedrychowski 2014	Cohort	Serious[a]	NA[b]	Not serious[c]	Serious[e]	None	257	1.40 (0.97, 2.03)	LOW
Postnatal PAH exposure									
Jedrychowski 2014	Cohort	Serious[a]	NA[b]	No serious[c]	Not serious[d]	None	257	1.61 (1.16, 2.24)	MODERATE
Pyrene									
Jung 2012	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[e]	None	349	1.53 (0.93, 2.51)	LOW
Σ8PAH non-volatile									
Jung 2012	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[e]	None	349	0.86 (0.52, 1.42)	LOW
Asthma									
Pyrene									
Jung 2012	Prospective cohort	Serious[a]	NA[b]	No serious[c]	Not serious[d]	None	349	1.90 (1.13, 3.20)	MODERATE
Σ8PAH non-volatile									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Jung 2012	Prospective cohort	Serious[a]	NA[b]	No serious[c]	Serious[e]	None	349	0.90 (0.52, 1.56)	LOW
Pyrene									
Jung 2014	Prospective cohort	Serious[a]	NA[b]	No serious[c]	Serious[e]	None	363	aRR 0.81 (0.59–1.12)	LOW
Σ8PAH non-volatile									
Jung 2014	Prospective cohort	Serious[a]	NA[b]	No serious[c]	Serious[e]	None	363	aRR 0.74 (0.46–1.18)	LOW
Σ8PAH semi-volatile									
Jung 2014	Prospective cohort	Serious[a]	NA[b]	No serious[c]	Serious[e]	None	363	aRR 0.82 (0.60–1.12)	LOW
Runny or stuffy nose									
per log unit of PAH concentration in ng/m^3									
Jedrychowski 2005	Cohort	Serious[a]	NA[b]	Not serious[c]	Serious[e]	None	333	1.11 (0.97, 1.27)	LOW
Earache (otitis media)									
per log unit of PAH concentration in ng/m^3									
Jedrychowski 2005	Cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	333	1.82 (1.03, 3.23)	MODERATE
Sore throat									
per log unit of PAH concentration in ng/m^3									
Jedrychowski 2005	Cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	333	1.27 (1.07, 1.52)	MODERATE
Cough									
per log unit of PAH concentration in ng/m^3									
Jedrychowski 2005	Cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	333	1.72 (1.02, 2.92)	MODERATE
Cough without cold									
per log unit of PAH concentration in ng/m^3									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Jedrychowski 2005	Cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	333	4.80 (2.73, 8.44)	MODERATE
Barking cough									
per log unit of PAH concentration in ng/m^3									
Jedrychowski 2005	Cohort	Serious[a]	NA[b]	Not serious[c]	Serious[e]	None	333	1.12 (0.82, 1.55)	LOW
Difficult (puffed) breathing,									
per log unit of PAH concentration in ng/m^3									
Jedrychowski 2005	Cohort	Serious[a]	NA[b]	Not serious[c]	Serious[e]	None	333	1.23 (0.83, 1.84)	LOW
Pulmonary infections									
Styrene>2.0 µg/m^3									
Diez 2002	Nested case-control	Serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	475	2.1 (1.1, 4.2)	LOW
Benzene > 5.6 µg/m^3									
Diez 2002	Nested case-control	Serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	475	2.4 (1.3, 4.5)	LOW

(a) Serious concerns over risk of bias due over self-report of outcomes
(b) Not applicable as only one study included
(c) No concerns over directness
(d) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)
(e) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)

F.2.6 Particulate matter

F.2.6.1 $PM_{2.5}$

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Cough									
Indoor $PM_{2.5}$ (Indoor) per 17.3 µg/m^3 increase									
Habre 2014	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	36	1.22 (0.91, 1.63)	LOW
Indoor $PM_{2.5}$ (indoor sources) per 17.6 µg/m^3 increase									
Habre 2014	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	36	1.20 (0.88, 1.64)	LOW
Pindus 2016	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	905	0.95 (0.72, 1.29)	LOW
Cough, wheezing or chest tightness in children with asthma									
Indoor $PM_{2.5}$ (per 10 µg/m^3 increase)									
McCormack 2009	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	150	1.06 (1.01, 1.12)	MODERATE
Wheeze									
$PM_{2.5}$ (Indoor) per 17.3 µg/m^3 increase									
Habre 2014	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	36	1.57 (1.09, 2.26)	MODERATE
$PM_{2.5}$ (indoor sources) per 17.6 µg/m^3 increase									
Habre 2014	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	36	1.55 (1.05, 2.28)	MODERATE
$PM_{2.5}$ ≥15µg/m^3									
Hunt 2011	Prospective cohort	Not serious[f]	NA[b]	Not serious[c]	Not serious[e]	None	103	4.21 (1.36, 13.03)	HIGH
$PM_{2.5}$ (prenatal exposure)									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Jedrychowski 2011	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[d]	None	322	1.06 (0.72, 1.57)	LOW
$PM_{2.5}$ per 8.75 µg/m³ increase									
Jung 2012 b	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	408	1.51 (1.05, 2.16)	MODERATE
$PM_{2.5}$ 10.6–13.2 µg/m³ in infants at risk of asthma									
Raaschou-Nielsen 2010	Cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	None	411	1.32 (0.53, 3.27)	MODERATE
$PM_{2.5}$ 13.2–16.8 µg/m³ in infants at risk of asthma									
Raaschou-Nielsen 2010	Cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	None	411	1.74 (0.67, 4.47)	MODERATE
$PM_{2.5}$ 16.8–24 µg/m³.in infants at risk of asthma									
Raaschou-Nielsen 2010	Cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	None	411	0.67 (0.28, 1.59)	MODERATE
$PM_{2.5}$ >24.1 µg/m³ in infants at risk of asthma									
Raaschou-Nielsen 2010	Cohort	Not serious[f]	NA[b]	Not serious[c]	Serious[d]	None	411	1.02 (0.41, 2.57)	MODERATE
Slowdown in children with asthma									
Indoor $PM_{2.5}$ (per 10 µg/m³ increase)									
McCormack 2009	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	150	1.04 (1.0, 1.09)	MODERATE
Symptoms with running in children with asthma									
Indoor $PM_{2.5}$ (per 10 µg/m³ increase)									
McCormack 2009	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	150	1.07 (1.02,1.11)	MODERATE
Nocturnal symptoms in children with asthma									
Indoor $PM_{2.5}$ (per 10 µg/m³ increase)									
McCormack 2009	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	150	1.06 (1.01, 1.10)	MODERATE

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Limited speech in children with asthma									
Indoor $PM_{2.5}$ (per 10 μg/m^3 increase)									
McCormack 2009	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	150	1.07 (1.00, 1.14)	MODERATE
Rescue medication use in children with asthma									
Indoor $PM_{2.5}$ (per 10 μg/m^3 increase)									
McCormack 2009	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[e]	None	150	1.04 (1.01, 1.08)	MODERATE

(a) Serious concerns over risk of bias due over self-report of outcomes
(b) Not applicable as only one study included
(c) No concerns over directness
(d) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)
(e) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)
(f) No concerns over risk of bias

F.2.6.2 PM_{10}

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
Cough, wheezing or chest tightness in children with asthma									
Indoor PM_{10} (per 10 μg/m^3 increase)									

No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Number	Adjusted relative effect (aOR 95%CI unless stated)	Quality
McCormack 2009	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	150	1.06 (1.01, 1.12)	MODERATE
Slowdown in children with asthma									
Indoor PM_{10} (per 10 μg/m^3 increase)									
McCormack 2009	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	150	1.08 (1.02, 1.14)	MODERATE
Symptoms with running in children with asthma									
Indoor PM_{10} (per 10 μg/m^3 increase)									
McCormack 2009	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Serious[e]	None	150	1.00 (0.94, 1.08)	LOW
Nocturnal symptoms in children with asthma									
Indoor PM_{10} (per 10 μg/m^3 increase)									
McCormack 2009	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	150	1.08 (1.01, 1.14)	MODERATE
Limited speech in children with asthma									
Indoor PM_{10} (per 10 μg/m^3 increase)									
McCormack 2009	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	150	1.11 (1.03, 1.19)	MODERATE
Rescue medication use in children with asthma									
Indoor PM_{10} (per 10 μg/m^3 increase)									
McCormack 2009	Prospective cohort	Serious[a]	NA[b]	Not serious[c]	Not serious[d]	None	150	1.06 (1.01, 1.10)	MODERATE

(a) Serious concerns over risk of bias due over self-report of exposure
(b) Not applicable as only one study included
(c) No concerns over directness
(d) No concerns as findings are statistically significant (95%CIs do not cross the line of no effect)
(e) Serious concerns as findings are not statistically significant (95%CIs cross the line of no effect)

Appendix G: Economic evidence study selection

No economic evidence review was carried out for this review

Economic evidence tables

Appendix H: Health economic evidence profiles

No economic evidence review was carried out for this review

Appendix I: Health economic analysis

No economic evidence modelling was carried out for this review

Excluded studies

I.1 Public health studies

	STUDY	REASON FOR EXCLUSION
1.	Abbing-Karahagopian V, van der Gugten--, AC, van der Ent et al (2012) Effect of endotoxin and allergens on neonatal lung function and infancy respiratory symptoms and eczema. Pediatric Allergy and Immunology 23(5), 448-455	Study is concerned with bacterial endotoxins
2.	Alderton LE, Spector LG, Blair CK et al (2006) Child and maternal household chemical exposure and the risk of acute leukemia in children with Down's syndrome: a report from the Children's Oncology Group. American journal of epidemiology 164(3), 212-21	Case control study and have included cohort studies of chemical exposure
3.	Aldous M B, Holberg C J, Wright A L, et al (1996) Evaporative cooling and other home factors and lower respiratory tract illness during the first year of life. Group Health Medical Associates. American journal of epidemiology 143(5), 423-30	Study is concerned with evaporative cooling.
4.	Amigou AI, Sermage-FC, Orsi L, et al (2011) Road traffic and childhood leukemia: the ESCALE study (SFCE). Environmental health perspectives 119(4), 566-72	Case control study and have included cohort studies of proximity to traffic
5.	Andersen Z J, Ravnskjer L, Andersen K K, et al (2017) Long-term exposure to fine particulate matter and breast cancer incidence in the Danish nurse cohort study. Cancer Epidemiology Biomarkers and Prevention 26(3), 428-430	Study does not provide data on proximity to traffic
6.	Annesi-Maesano I, Norback D, Zielinski J, et al (2013) Geriatric study in Europe on health effects of air quality in nursing homes (GERIE study) profile: objectives, study protocol and descriptive data. Multidisciplinary Respiratory Medicine. 21;8(1):7	Protocol for a study
7.	Araki A, Kanazawa A, Kawai T, et al (2012) The relationship between exposure to microbial volatile organic compound and allergy prevalence in single-family homes. Science of the Total Environment 423, 18-26	Country not similar to UK
8.	Arif AA, and Shah SM (2007) Association between personal exposure to volatile organic compounds and asthma among US adult population. International archives of occupational and environmental health 80(8), 711-9	Cross-sectional study
9.	Baccarelli Andrea, Martinelli Ida, Pegoraro Valeria, et al (2009) Living near major traffic roads and risk of deep vein thrombosis. Circulation 119(24), 3118-24	Case control study and have included cohort studies of proximity to traffic
10.	Bailey H D, De Klerk , N H, Fritschi L, et al (2011) Refuelling of vehicles, the use of wood burners and the risk of acute lymphoblastic leukaemia in childhood. Paediatric and Perinatal Epidemiology 25(6), 528-539	Case control study and have included cohort studies of heating fuel
11.	Bailey HD, Metayer C, Milne E, et al (2015) Home paint exposures and risk of childhood acute lymphoblastic leukemia: findings from the Childhood Leukemia International Consortium. Cancer Causes and Control 26(9), 1257-1270	Case-control study and have included cohort studies of VOC
12.	Bailey HD, Milne E, de Klerk , NH, et al (2011) Exposure to house painting and the use of floor treatments and the risk of childhood acute lymphoblastic leukemia. International journal of cancer 128(10), 2405-14	Case control study and have included cohort studies of VOC

	STUDY	REASON FOR EXCLUSION
13.	Bakolis I, Heinrich J, Zock J P et al (2015) House dust-mite allergen exposure is associated with serum specific IgE but not with respiratory outcomes. Indoor air 25(3), 235-44	Cross-sectional study
14.	Balmes J R, Cisternas M, Quinlan P J, et al (2014) Annual average ambient particulate matter exposure estimates, measured home particulate matter, and hair nicotine are associated with respiratory outcomes in adults with asthma. Environmental Research 129, 1-10	Cross-sectional study
15.	Barry A C, Mannino D M, Hopenhayn C et al (2010) Exposure to indoor biomass fuel pollutants and asthma prevalence in Southeastern Kentucky: results from the Burden of Lung Disease (BOLD) study. The Journal of asthma : official journal of the Association for the Care of Asthma 47(7), 735-41	Cross-sectional study
16.	Batlles Garrido, J, Torres-Borrego J, Bonillo Perales, A , et al . 2010. "Prevalence and factors linked to atopic eczema in 10- and 11-year-old schoolchildren. Isaac 2 in Almeria, Spain". Allergologia et immunopathologia 38(4):174-80.	Cross-sectional study
17.	Baxter LK, Clougherty JE, Laden F et al (2007) Predictors of concentrations of nitrogen dioxide, fine particulate matter, and particle constituents inside of lower socioeconomic status urban homes.. Journal of exposure science & environmental epidemiology 17(5), 433-44	Cross-sectional study
18.	Baxter LK, Clougherty JE, Paciorek CJ, et al (2007) Predicting residential indoor concentrations of nitrogen dioxide, fine particulate matter, and elemental carbon using questionnaire and geographic information system based data. Atmospheric Environment 41(31), 6561-6571	Cross-sectional study
19.	Beamer PI, Lothrop N, Lu Z et al (2016) Spatial clusters of child lower respiratory illnesses associated with community-level risk factors. Pediatric pulmonology 51(6), 633-42	Study concerned with spatial analysis and not on poor indoor air quality
20.	Beckett WS, Gent JF, Naeher LP, et al (2006) Peak expiratory flow rate variability is not affected by home combustion sources in a group of nonsmoking women. Archives of Environmental and Occupational Health. ;61(4):176-82	Cross sectional study
21.	Behbod B, Sordillo JE, Hoffman EB et al (2015) Asthma and allergy development: contrasting influences of yeasts and other fungal exposures. Clinical and experimental allergy : journal of the British Society for Allergy and Clinical Immunology 45(1), 154-63	Study is concerned with fungal concentration and diversity
22.	Behbod B, Sordillo JE, Hoffman EB, et al (2013) Wheeze in infancy: protection associated with yeasts in house dust contrasts with increased risk associated with yeasts in indoor air and other fungal taxa. Allergy 68(11), 1410-8	Study is concerned with fungal concentration and diversity
23.	Bennett CM, Dharmage SC, Matheson M et al (2010) Ambient wood smoke exposure and respiratory symptoms in Tasmania, Australia. The Science of the total environment 409(2), 294-9	Study is concerned with respiratory symptoms and outdoor wood smoke
24.	Bentayeb M, Billionnet C, Baiz N et al (2013) Higher prevalence of breathlessness in elderly exposed to indoor aldehydes and VOCs in a representative sample of French dwellings. Respiratory medicine 107(10), 1598-607	Cross-sectional study

	STUDY	REASON FOR EXCLUSION
25.	Bentayeb M, Norback D, Bednarek M et al (2015) Indoor air quality, ventilation and respiratory health in elderly residents living in nursing homes in Europe. The European respiratory journal 45(5), 1228-38	Cross-sectional study
26.	Bjornsson E, Norback D, Janson C, et al. 1995. "Asthmatic symptoms and indoor levels of micro-organisms and house dust mites". Clinical and Experimental Allergy 25(5):423-431.	Case-control study and we have cohorts on allergens
27.	Blount RJ, Pascopella L, Catanzaro DG, et al (2017) Traffic-Related Air Pollution and All-Cause Mortality during Tuberculosis Treatment in California. Environmental health perspectives 125(9), 097026	Study does not report data that can be used
28.	Bornehag CG, Sundell J, Weschler CJ, et al (2004) The association between asthma and allergic symptoms in children and phthalates in house dust: a nested case-control study. Environmental health perspectives 112(14), 1393-7	Nested case-control and we have cohort evidence on this topic
29.	Bothwell J E, McManus L, Crawford VL et al (2003) Home heating and respiratory symptoms among children in Belfast, Northern Ireland. Archives of environmental health 58(9), 549-53	Cross-sectional study
30.	Brown T, Dassonville C, Derbez M et al (2015) Relationships between socioeconomic and lifestyle factors and indoor air quality in French dwellings. Environmental research 140, 385-96	Cross-sectional survey
31.	Brunekreef B, Smit J, de Jongste J, et al (2002) The prevention and incidence of asthma and mite allergy (PIAMA) birth cohort study: design and first results. Pediatric allergy and immunology : official publication of the European Society of Pediatric Allergy and Immunology 13 Suppl 15, 55-60	Studies do not have any results that can be used
32.	Brussee JE, Smit HA, van Strien , RT, et al (2005) Allergen exposure in infancy and the development of sensitization, wheeze, and asthma at 4 years. The Journal of allergy and clinical immunology 115(5), 946-52	Study report of on risk in terms in terms of categories but reports medians of each category not the range
33.	Bundy K W, Gent J F, Beckett W et al (2009). Household airborne Penicillium associated with peak expiratory flow variability in asthmatic children. Annals of allergy, asthma & immunology: official publication of the American College of Allergy, Asthma, and & Immunology, 103(1), pp.26-30.	Cross-sectional study
34.	Canova C, Jarvis D, Walker S et al (2013). Systematic review of the effects of domestic paints on asthma related symptoms in people with or without asthma. The Journal of asthma: official journal of the Association for the Care of Asthma, 50(10), pp.1020-30.	Systematic review. Checked references for possible includes
35.	Carlos-Wallace FM, Zhang L, Smith MT, et al (2016) Parental, In Utero, and Early-Life Exposure to Benzene and the Risk of Childhood Leukemia: A Meta-Analysis. American journal of epidemiology 183(1), 1-14	Systematic review
36.	Casas L, Tischer C, Wouters I M et al (2013) Early life microbial exposure and fractional exhaled nitric oxide in school-age children: a prospective birth cohort study. Environmental health: a global access science source, 12, pp.103.	Study is concerned with bacterial endotoxins

	STUDY	REASON FOR EXCLUSION
37.	Casas L, Torrent M, Zock J-P, et al (2013) Early life exposures to home dampness, pet ownership and farm animal contact and neuropsylhological development in 4 year old children: a prospective birth cohort study. International journal of hygiene and environmental health 216(6), 690-7	Study do not report on outcomes of interest
38.	Chen CM, Sausenthaler S, Bischof W, et al (2010) Perinatal exposure to endotoxin and the development of eczema during the first 6 years of life. Clinical and experimental dermatology 35(3), 238-44	Study is concerned with bacterial endotoxins
39.	Chew GL, Rogers C, Burge HA, et al (2003) Dustborne and airborne fungal propagules represent a different spectrum of fungi with differing relations to home characteristics. Allergy 58(1), 13-20	Cross-sectional analysis of cohort data
40.	Cho SH, Reponen T, Bernstein DI, et al (2006) The effect of home characteristics on dust antigen concentrations and loads in homes. Science of the Total Environment 371(1-3), 31-43	Cross-sectional analysis of cohort data
41.	Colt JS, Hartge P, Davis S, et al (2007) Hobbies with solvent exposure and risk of non-Hodgkin lymphoma. Cancer causes & control : CCC 18(4), 385-90	Case control study
42.	Crawford J A, Rosenbaum P F, Anagnost S E et al (2015) Indicators of airborne fungal concentrations in urban homes: understanding the conditions that affect indoor fungal exposures. The Science of the total environment 517, 113-24	Study concerned with fungal diversity and fungal concentration
43.	Cuijpers C E, Swaen G M, Wesseling G et al (1995) Adverse effects of the indoor environment on respiratory health in primary school children. Environmental research 68(1), 11-23	Cross-sectional study
44.	Custovic A, Simpson B M, Simpson A, et al (2003) Current mite, cat, and dog allergen exposure, pet ownership, and sensitization to inhalant allergens in adults. The Journal of allergy and clinical immunology 111(2), 402-7	Cross-sectional study
45.	Dales R, Miller D, Ruest K, et al (2006) Airborne endotoxin is associated with respiratory illness in the first 2 years of life. Environmental health perspectives 114(4), 610-4	Study is concerned with bacterial endotoxins
46.	Dallongeville A, Le Cann P , Zmirou-Navier D et al (2015) Concentration and determinants of molds and allergens in indoor air and house dust of French dwellings. The Science of the total environment 536, 964-72	Study concerned with fungal diversity and fungal concentration. Not on risk factors.
47.	Daniel AB, Shah H, Kamath Asha, et al (2012) Environmental tobacco and wood smoke increase the risk of Legg-Calve-Perthes disease. Clinical orthopaedics and related research 470(9), 2369-75	Country not similar to UK
48.	Dannemiller KC, Gent JF, Leaderer BP et al (2016) Influence of housing characteristics on bacterial and fungal communities in homes of asthmatic children. Indoor air 26(2), 179-92	Study interested in housing characteristics and microbial ecology
49.	Dannemiller KC, Gent JF, Leaderer BP, and Peccia Jordan (2016) Indoor microbial communities: Influence on asthma severity in atopic and nonatopic children. The Journal of allergy and clinical immunology 138(1), 76-83.e1	Study is concerned with atopic status and asthma severity
50.	Dannemiller KC, Mendell MJ, Macher JM et al (2014) Next-generation DNA sequencing reveals that low fungal diversity in	Study concerned with fungal diversity

	STUDY	REASON FOR EXCLUSION
	house dust is associated with childhood asthma development. Indoor air 24(3), 236-47	and asthma development
51.	Danysh HE, Zhang K, Mitchell LE, et al (2016) Maternal residential proximity to major roadways at delivery and childhood central nervous system tumors. Environmental research 146, 315-22	Case control study and have cohort study on proximity to traffic
52.	de Bilderling G , Mathot M, Agustsson S (2008). Early skin sensitization to aeroallergens. Clinical and experimental allergy: journal of the British Society for Allergy and Clinical Immunology, 38(4), pp.643-8.	Study is concerned with early skin testing to aeroallergens and not on indoor pollutants
53.	De Roos , AJ, Koehoorn M, Tamburic L, et al (2014) Proximity to traffic, ambient air pollution, and community noise in relation to incident rheumatoid arthritis. Environmental health perspectives 122(10), 1075-80	Case control study
54.	Dean T, Venter C, Pereira B, et al (2007) Patterns of sensitization to food and aeroallergens in the first 3 years of life. The Journal of allergy and clinical immunology 120(5), 1166-71	Study has no adjustment for confounders
55.	DellaValle CT, Deziel NC, Jones RR, et al (2016) Polycyclic aromatic hydrocarbons: determinants of residential carpet dust levels and risk of non-Hodgkin lymphoma. Cancer causes & control : CCC 27(1), 1-13	Case control study and have cohort study on
56.	Deshmukh JS, Motghare DD, Zodpey SP et al (1998) Low birth weight and associated maternal factors in an urban area. Indian pediatrics 35(1), 33-36	Study is concerned with exposure to tobacco as a risk factor for low birth weight
57.	Dharmage S, Bailey M, Raven J et al (1999) Prevalence and residential determinants of fungi within homes in Melbourne, Australia. Clinical and experimental allergy : journal of the British Society for Allergy and Clinical Immunology 29(11), 1481-9	Cross-sectional study
58.	Dharmage S, Bailey M, Raven J, et al. 1999. "Residential characteristics influence Der p 1 levels in homes in Melbourne, Australia". Clinical and experimental allergy: journal of the British Society for Allergy and Clinical Immunology 29(4):461-9.	Cross-sectional study
59.	Diette B G, Hansel N N, Buckley T J et al (2007) Home indoor pollutant exposures among inner-city children with and without asthma. Environmental health perspectives, 115(11), pp.1665-9.	Cohort study without adjustment for confounding variables
60.	Dong G H, Qian Z, Liu M M et al (2014) Ambient air pollution and the prevalence of obesity in Chinese children: The seven northeastern cities study. Obesity 22(3), 795-800	Country not similar to UK
61.	Dorans KS, Wilker EH, (2017) Residential proximity to major roads, exposure to fine particulate matter and aortic calcium: the Framingham Heart Study, a cohort study. BMJ open 7(3), e013455	Study is concerned with markers for aortic calcification
62.	Dorans KS, Wilker EH, Li W, et al (2016) Residential Proximity to Major Roads, Exposure to Fine Particulate Matter, and Coronary Artery Calcium. Arteriosclerosis, Thrombosis, and and Vascular Biology 36(8), 1679-85	Study is concerned with markers for aortic calcification

	STUDY	REASON FOR EXCLUSION
63.	Douwes J, Doekes G, Heinrich J, et al (2004) Endotoxin and β(1→3)-Glucan in House Dust and the Relation with Home Characteristics: A Pilot Study in 25 German Houses. Indoor Air 8(4), 255-263	Cross-sectional study
64.	Edwards S C, Jedrychowski W, Butscher M et al (2010) Prenatal exposure to airborne polycyclic aromatic hydrocarbons and children's intelligence at 5 years of age in a prospective cohort study in Poland. Environmental Health Perspectives 118(9), 1326-1331	Study is concerned with outdoor and indoor air pollution and data are not presented separately by source of pollutant
65.	Eiffert S, Noibi Y, Vesper S, et al (2016) A Citizen-Science Study Documents Environmental Exposures and Asthma Prevalence in Two Communities. Journal of environmental and public health, 2016, pp.1962901.	Cross-sectional study
66.	Eisner MD, and Blanc PD (2003) Gas stove use and respiratory health among adults with asthma in NHANES III. Occupational and Environmental Medicine 60(10), 759-764	Cross-sectional study
67.	Emond A M, Howat P, Evans J A, and Hunt L (1997) The effects of housing on the health of preterm infants. Paediatric and perinatal epidemiology 11(2), 228-39	Case control study and have cohort study on preterm, gas ovens, gas stoves and overcrowding
68.	Engvall K, Norrby C, and Norback D (2001) Asthma symptoms in relation to building dampness and odour in older multifamily houses in Stockholm. The international journal of tuberculosis and lung disease : the official journal of the International Union against Tuberculosis and Lung Disease 5(5), 468-77	Cross-sectional study
69.	Engvall K, Norrby C, Bandel J, et al (2001) Development of a Multiple Regression Model to Identify Multi-Family Residential Buildings with a High Prevalence of Sick Building Syndrome (SBS). Indoor Air 10(2), 101-110	Cross-sectional study
70.	Engvall K, Norrby C, and Norback D (2003) Ocular, nasal, dermal and respiratory symptoms in relation to heating, ventilation, energy conservation, and reconstruction of older multi-family houses. Indoor air 13(3), 206-11	Cross-sectional study
71.	Engvall K, Norrby C, and Norback Dan (2002) Ocular, airway, and dermal symptoms related to building dampness and odors in dwellings. Archives of environmental health 57(4), 304-10	Cross-sectional study
72.	Erdmann CA, and Apte MG (2004) Mucous membrane and lower respiratory building related symptoms in relation to indoor carbon dioxide concentrations in the 100-building BASE dataset. Indoor air 14 Suppl 8, 127-34	Study concerned with indoor air quality in the workplace
73.	Farooq U, Joshi M, Nookala V, et al (2010) Self-reported exposure to pesticides in residential settings and risk of breast cancer: a case-control study. Environmental health : a global access science source 9, 30	Case control study and have cohort study on pesticides
74.	Filippini T, Heck JE, Malagoli C, et al (2015) A review and meta-analysis of outdoor air pollution and risk of childhood leukemia. Journal of environmental science and health. Part C, and Environmental carcinogenesis & ecotoxicology reviews 33(1), 36-66	Systematic review and not relevant to this guideline

	STUDY	REASON FOR EXCLUSION
75.	Finn P W, Boudreau J O, He H, et al (2000) Children at risk for asthma: Home allergen levels, lymphocyte proliferation, and wheeze. Journal of Allergy and Clinical Immunology 105(5), 933-942	Study does not report complete data
76.	Fleisch AF, Rifas-Shiman SL, Koutrakis P, et al (2015) Prenatal exposure to traffic pollution: associations with reduced fetal growth and rapid infant weight gain. Epidemiology (Cambridge, and Mass.) 26(1), 43-50	Study not concerned with proximity to traffic
77.	Fleisch A F, Luttmann-Gibson H, Perng W, et al (2017) Prenatal and early life exposure to traffic pollution and cardiometabolic health in childhood. Pediatric obesity 12(1), 48-57	Study concerned with markers for cardio-metabolic health
78.	Freedman DM, Stewart P, Kleinerman RA, et al (2001) Household solvent exposures and childhood acute lymphoblastic leukemia. American journal of public health 91(4), 564-7	Case control study and have cohort study on solvents
79.	Gauderman WJ, Vora H, McConnell R, et al (2007) Effect of exposure to traffic on lung development from 10 to 18 years of age: a cohort study. Lancet (London, and England) 369(9561), 571-7	Odds/risk ratios not reported
80.	Gauderman WJ, Avol E, Lurmann F, et al . 2005. "Childhood asthma and exposure to traffic and nitrogen dioxide". Epidemiology (Cambridge, and Mass.) 16(6):737-43.	Study does not present data in a way that can be re-used
81.	Gehring U, Bischof W, Fahlbusch B, et al (2002) House dust endotoxin and allergic sensitization in children. American Journal of Respiratory and Critical Care Medicine 166(7), 939-944	Study is concerned with bacterial endotoxins
82.	Gehring U, Bolte G, Borte M et al (2001) Exposure to endotoxin decreases the risk of atopic eczema in infancy: a cohort study. The Journal of allergy and clinical immunology 108(5), 847-54	Study is concerned with bacterial endotoxins
83.	Gehring U, Heinrich J, Hoek G et al (2007) Bacteria and mould components in house dust and children's allergic sensitisation. The European respiratory journal 29(6), 1144-53	Case control study and have cohort study on house dust.
84.	Gent J F, Ren P, Belanger K et al (2002). Levels of household mould associated with respiratory symptoms in the first year of life in a cohort at risk for asthma. Environmental health perspectives, 110(12), pp.A781-6.	Study concerned with the microbiological component/diversity of mould
85.	Ghosh R, Amirian E, Dostal M, Sram R J, et al (2011) Indoor coal use and early childhood growth. Archives of Pediatrics and Adolescent Medicine 165(6), 492-497	Study reports on decrease z scores not adjusted OR / RR
86.	Gillespie J, Wickens K, Siebers R, et al (2006) Endotoxin exposure, wheezing, and rash in infancy in a New Zealand birth cohort. The Journal of allergy and clinical immunology 118(6), 1265-70	Study is concerned with bacterial endotoxins
87.	Godish T (1990) Residential formaldehyde: Increased exposure levels aggravate adverse health effects. Journal of Environmental Health 53(3), 34-37	Study without adjustment for confounding variables
88.	Greenop KR, Peters S, Fritschi L, et al (2014) Exposure to household painting and floor treatments, and parental occupational paint exposure and risk of childhood brain	Case control study and have cohort study on painting

	STUDY	REASON FOR EXCLUSION
	tumors: results from an Australian case-control study. Cancer causes & control : CCC 25(3), 283-91	
89.	Greenop KR, Hinwood AL, Fritschi L, et al (2015) Vehicle refuelling, use of domestic wood heaters and the risk of childhood brain tumours: Results from an Australian case-control study. Pediatric blood & cancer 62(2), 229-234	Case control study and have cohort on factors of interest
90.	Gross I, Heinrich J, Fahlbusch B, et al (2000) Indoor determinants of Der p 1 and Der f 1 concentrations in house dust are different. Clinical and experimental allergy : journal of the British Society for Allergy and Clinical Immunology 30(3), 376-82	Cross-sectional analysis of cohort data
91.	Gunnbjornsdottir M I, Franklin K A, Norback D, et al (2006) Prevalence and incidence of respiratory symptoms in relation to indoor dampness: the RHINE study. Thorax 61(3), 221-5	Cross sectional study
92.	Gunnbjornsdottir M I, Norback D, Plaschke P, et al (2003) The relationship between indicators of building dampness and respiratory health in young Swedish adults. Respiratory medicine 97(4), 302-7	Cross sectional study
93.	Guxens M, Aguilera I, Ballester F et al (2012) Prenatal exposure to residential air pollution and infant mental development: modulation by antioxidants and detoxification factors. Environmental health perspectives 120(1), 144-9	Study is concerned with outdoor air pollution
94.	Hagerhed-Engman L, Bornehag CG, and Sundell J (2009) Building characteristics associated with moisture related problems in 8,918 Swedish dwellings.. International journal of environmental health research 19(4), 251-65	Cross sectional study
95.	Halterman J S, Lynch K A, Conn K M et al (2009) Environmental exposures and respiratory morbidity among very low birth weight infants at 1 year of life. Archives of disease in childhood 94(1), 28-32	Odds/risk ratios for pre-specified pollutants not reported
96.	Harris MH, Gold DR, Rifas-Shiman SL, et al (2015) Prenatal and Childhood Traffic-Related Pollution Exposure and Childhood Cognition in the Project Viva Cohort (Massachusetts, USA). Environmental health perspectives 123(10), 1072-8	Study concerned with markers for cognition
97.	Heinrich J, Topp R, Gehring U, et al (2005) Traffic at residential address, respiratory health, and atopy in adults: the National German Health Survey 1998. Environmental research 98(2), 240-9	Cross sectional study
98.	Herbarth O, Fritz G J, Rehwagen M (2006) Association between indoor renovation activities and eczema in early childhood. International journal of hygiene and environmental health 209(3), 241-7	Cross sectional study
99.	Hernberg S, Sripaiboonkij P, Quansah R, et al (2014). Indoor molds and lung function in healthy adults. Respiratory Medicine. 2014 108(5):677-84	Cross sectional study
100.	Hinwood A L, Callan A C, Heyworth J (2014) Polychlorinated biphenyl (PCB) and dioxin concentrations in residential dust of pregnant women. Environmental science. Processes & impacts 16(12), 2758-63	Cross sectional study
101.	Holm S M, Balmes J, Gillette D, et al (2018) Cooking behaviors are related to household particulate matter exposure in	Study not present usable data

	STUDY	REASON FOR EXCLUSION
	children with asthma in the urban East Bay Area of Northern California. PLoS ONE 13(6), e0197199	
102.	Horick N, Weller E, Milton D K et al (2006) Home endotoxin exposure and wheeze in infants: correction for bias due to exposure measurement error. Environmental health perspectives 114(1), 135-40	Study is concerned with bacterial endotoxins
103.	Houot J, Marquant F, Goujon S, et al (2014) Residential Proximity to Heavy-Traffic Roads, Benzene Exposure, and Childhood Leukemia-The GEOCAP Study, 2002-2007. American Journal of Epidemiology 182(8), 685-693	Case control study and have cohort study on proximity to traffic
104.	Huss K, Adkinson N F, Jr, Eggleston P A et al (2001). House dust mite and cockroach exposure are strong risk factors for positive allergy skin test responses in the Childhood Asthma Management Program. The Journal of allergy and clinical immunology, 107(1), pp.48-54.	Cross sectional study
105.	Hwang B F, Liu I P, and Huang T P (2011) Molds, parental atopy and pediatric incident asthma. Indoor Air 21(6), 472-478	Country not similar to UK
106.	Iossifova Y, Reponen T, Sucharew H et al (2008) Use of (1-3)-beta-d-glucan concentrations in dust as a surrogate method for estimating specific fungal exposures. Indoor air 18(3), 225-32	Study is concerned with bacterial endotoxins
107.	Iossifova YY, Reponen T, Bernstein DI, et al (2007) House dust (1-3)-beta-D-glucan and wheezing in infants. Allergy 62(5), 504-13	Study is concerned with bacterial endotoxins
108.	Jaakkola M S, Quansah R, Hugg T T, (2013) Association of indoor dampness and molds with rhinitis risk: A systematic review and meta-analysis. Journal of Allergy and Clinical Immunology 132(5), 1099	Systematic review
109.	Jaakkola MS, Nordman H, Piipari R, et al (2002) Indoor dampness and molds and development of adult-onset asthma: A population-based incident case-control study. Environmental Health Perspectives 110(5), 543-547	Case control study and have cohort study on damp
110.	Jaakkola JJ, Oie L, Nafstad P, et al (1999) Interior surface materials in the home and the development of bronchial obstruction in young children in Oslo, Norway. American journal of public health 89(2), 188-92	Case control study
111.	Jacob B, Ritz B, Gehring U, et al. (2002) Indoor exposure to molds and allergic sensitization. Environmental Health Perspectives. 110(7):647-53	Case control study and have cohort study on damp
112.	Jarvis D, Chinn S, Luczynska C, et al (1997) The association of family size with atopy and atopic disease. Clinical and experimental allergy 27(3), 240-245	Cross sectional study
113.	Jarvis D, Zock JP, Heinrich J, et al (2007) Cat and dust mite allergen levels, specific IgG and IgG4, and respiratory symptoms in adults. The Journal of allergy and clinical immunology 119(3), 697-704	Study concerned with exposure to pets and sensitization
114.	Jedrychowski W A, Perera F P, Maugeri U et al (2012) Prohypertensive effect of gestational personal exposure to fine particulate matter. Prospective cohort study in non-smoking and non-obese pregnant women. Cardiovascular toxicology 12(3), 216-25	Study does not report adjusted ratios for risk
115.	Jedrychowski W, Maugeri U, Mroz E, et al . 2012. "Fractional exhaled nitric oxide in healthy non-asthmatic 7-year olds and	Study concerned with markers of illness

	STUDY	REASON FOR EXCLUSION
	prenatal exposure to polycyclic aromatic hydrocarbons: nested regression analysis". Pediatric pulmonology 47(11):1131-9.	
116.	Jedrychowski W, Maugeri U, Jedrychowska-Bianchi I et al (2002) The effect of house dust mite sensitization on lung size and airway caliber in symptomatic and nonsymptomatic preadolescent children: a community-based study in Poland. Environmental health perspectives 110(6), 571-4	Cross sectional study
117.	Jedrychowski WA, Perera FP, Spengler JD, et al (2013) Intrauterine exposure to fine particulate matter as a risk factor for increased susceptibility to acute broncho-pulmonary infections in early childhood. International journal of hygiene and environmental health 216(4), 395-401	Study reports on risk factors for increased susceptibility to respiratory infections
118.	Jedrychowski W, Maugeri U, Jedrychowska-Bianchi I et al (2005) Effect of indoor air quality in the postnatal period on lung function in pre-adolescent children: a retrospective cohort study in Poland. Public health 119(6), 535-41	Study concerned with a combination of ETS and household heating with no separate data reported
119.	Jedrychowski W, Maugeri U, Perera F, et al (2011) Cognitive function of 6-year old children exposed to mold-contaminated homes in early postnatal period. Prospective birth cohort study in Poland. Physiology & behavior 104(5), 989-95	Study is concerned with duration of exposure
120.	Jedrychowski WA, Maugeri , Spengler J, et al (2013) Dose-dependent relationship between prenatal exposure to fine particulates and exhaled carbon monoxide in non-asthmatic children. A population-based birth cohort study. International journal of occupational medicine and environmental health 26(1), 73-82	Study is concerned with (exhaled Carbon Monoxide) Eco markers
121.	Jedrychowski W, Maugeri U, Zembala M, et al (2007). Risk of wheezing associated with house-dust mite allergens and indoor air quality among three-year-old children. Kraków inner city study. International Journal of Occupational Medicine and Environmental Health. 20(2):117-26	Cross sectional study
122.	Jedrychowski W, Flak E, Mroz E, et al (2008) Modulating effects of maternal fish consumption on the occurrence of respiratory symptoms in early infancy attributed to prenatal exposure to fine particles. Annals of nutrition & metabolism 52(1), 8-16	Study reports on risk for the number of days with symptoms
123.	Jedrychowski WA, Perera FP, Majewska R, et al (2015) Depressed height gain of children associated with intrauterine exposure to polycyclic aromatic hydrocarbons (PAH) and heavy metals: the cohort prospective study. Environmental research 136, 141-7	Study does not report data that can be used.
124.	Johansen J D, Andersen T F, Thomsen L K, et al. 2000. "Rash related to use of scented products. A questionnaire study in the Danish population. Is the problem increasing?" Contact dermatitis 42(4):222-6.	Cross sectional study
125.	Johansson E, Reponen T, Vesper S et al (2013) Microbial content of household dust associated with exhaled NO in asthmatic children. Environment international 59, 141-7	Study is concerned with bacterial endotoxins
126.	Just A C, Whyatt R M, Miller R L et al (2012) Children's urinary phthalate metabolites and fractional exhaled nitric oxide in an urban cohort. American journal of respiratory and critical care medicine 186(9), 830-7	Cross sectional study

	STUDY	REASON FOR EXCLUSION
127.	Karr C J, Rudra C B, Miller K A et.al (2009) Infant exposure to fine particulate matter and traffic and risk of hospitalization for RSV bronchiolitis in a region with lower ambient air pollution. Environmental research 109(3), 321-7	Case-control study
128.	Karvonen A M, Hyvarinen A, Gehring U, et al (2012) Exposure to microbial agents in house dust and wheezing, atopic dermatitis and atopic sensitization in early childhood: a birth cohort study in rural areas. Clinical and experimental allergy : journal of the British Society for Allergy and Clinical Immunology 42(8), 1246-56	Study does not have a multi-variate analysis
129.	Karvonen AM, Hyvarinen A, Roponen M et al . 2009. "Confirmed moisture damage at home, respiratory symptoms and atopy in early life: a birth-cohort study". Pediatrics 124(2):e329-38.	Conference abstract with insufficient detail to assess risk of bias
130.	Kato I, Koenig KL, Watanabe-Meserve H, et al (2005) Personal and occupational exposure to organic solvents and risk of non-Hodgkin's lymphoma (NHL) in women (United States). Cancer causes & control : CCC 16(10), 1215-24	Case control study and have cohort study on solvents
131.	Kidon MI, Chiang WC, Liew WK, et al. (2005) Sensitization to dust mites in children with allergic rhinitis in Singapore: does it matter if you scratch while you sneeze?. Clinical and experimental allergy : journal of the British Society for Allergy and Clinical Immunology 35(4), 434-40	Country not similar to UK
132.	Kilpelainen M, Koskenvuo M, Helenius H et al (2001) Wood stove heating, asthma and allergies. Respiratory medicine 95(11), 911-6	Cross sectional study
133.	Kingsley SL, Eliot MN, Whitsel EA, et al (2016) Maternal residential proximity to major roadways, birth weight, and placental DNA methylation. Environment international 92-93, 43-9	Study reports results that cannot be disaggregated to distance to road.
134.	Kirjavainen PV, Taubel M, Karvonen AM, et al (2016) Microbial secondary metabolites in homes in association with moisture damage and asthma. Indoor air 26(3), 448-456	Study does not report on outcomes of interest
135.	Kwon J H, Kim E, Chang M et al (2015) Indoor total volatile organic compounds exposure at 6 months followed by atopic dermatitis at 3 years in children. Pediatric allergy and immunology : official publication of the European Society of Pediatric Allergy and Immunology 26(4), 352-8	Country not similar to UK
136.	Langer S, Ramalho O, Le Ponner et al (2017) Perceived indoor air quality and its relationship to air pollutants in French dwellings. Indoor air 27(6), 1168-1176	Study concerned with perceived air quality
137.	Langer S, and Beko G (2013) Indoor air quality in the Swedish housing stock and its dependence on building characteristics. Building & Environment 69, 44-54	Study does not report data that can be used.
138.	Langer S, Ramalho O, Derbez M et al (2016) Indoor environmental quality in French dwellings and building characteristics. Atmospheric Environment 128, 82-91	Study does not report data that can be used.
139.	Leaderer BP, Belanger K, Triche E, et al (2002) Dust mite, cockroach, cat, and dog allergen concentrations in homes of asthmatic children in the Northeastern United States: Impact of socioeconomic factors and population density. Environmental Health Perspectives 110(4), 419-425	Cross sectional study

	STUDY	REASON FOR EXCLUSION
140.	Lee K, Yanagisawa Y, Spengler JD et al (1996) Classification of House Characteristics in a Boston Residential Nitrogen Dioxide Characterization Study. Indoor Air 6(3), 211-216	Study does not adjust for confounding variables
141.	Levy J I, Welker-Hood L K, Clougherty J E et al (2004) Lung function, asthma symptoms, and quality of life for children in public housing in Boston: a case-series analysis. Environmental health : a global access science source 3(1), 13	Study not concerned with indoor air quality
142.	Lin S, Jones R, Munsie J P, Nayak S G, Fitzgerald E F, and Hwang S A (2012) Childhood asthma and indoor allergen exposure and sensitization in Buffalo, New York. International journal of hygiene and environmental health 215(3), 297-305	Study does not present adjusted OR / RR
143.	Lindfors A, Wickman M, Hedlin G, et al (1995) Indoor environmental risk factors in young asthmatics: a case-control study. Archives of disease in childhood 73(5), 408-12	Study does not present adjusted OR / RR
144.	Lipfert F W, Zhang J, and Wyzga R E (2000) Infant mortality and air pollution: a comprehensive analysis of U.S. data for 1990. Journal of the Air & Waste Management Association (1995) 50(8), 1350-66	Study is concerned with outdoor and indoor air pollution with no disaggregation of data
145.	Litonjua AA, Carey VJ, Burge HA, et al (2001) Exposure to cockroach allergen in the home is associated with incident doctor-diagnosed asthma and recurrent wheezing. Journal of Allergy and Clinical Immunology 107(1), 41-47	Study addressing cockroach allergen.
146.	Liu X, Tan L, Yu I T et al (2018) Household cleaning products and the risk of allergic dermatitis: a prospective cohort study with primary-school children. Journal of the European Academy of Dermatology and Venereology 32(4), 624-631	Country not similar to UK
147.	Llanora G V, Ming L J, Wei L M, Van Bever , and H P S (2012) House dust mite sensitization in toddlers predict persistent wheeze in children between eight to fourteen years old. Asia Pacific Allergy 2(3), 181-186	Country not similar to UK
148.	Lodge CJ, Lowe AJ, Gurrin LC, et al (2011) House dust mite sensitization in toddlers predicts current wheeze at age 12 years. The Journal of allergy and clinical immunology 128(4), 782-788.e9	Study is concerned with sensitization as a risk factor
149.	Lowe L A, Woodcock A, Murray C S et al (2004) Lung function at age 3 years: effect of pet ownership and exposure to indoor allergens. Archives of paediatrics & adolescent medicine 158(10), 996-1001	Study without adjustment for confounding variables
150.	Lu Y, Lin S, Lawrence W R et al (2018). Evidence from SINPHONIE project: Impact of home environmental exposures on respiratory health among school-age children in Romania. The Science of the total environment, 621, pp.75-84.	Cross sectional study
151.	Ma Xiaomei, Buffler Patricia A, Gunier Robert B, Dahl Gary, Smith Martyn T, Reinier Kyndaron, and Reynolds Peggy (2002) Critical windows of exposure to household pesticides and risk of childhood leukemia. Environmental health perspectives 110(9), 955-60	Case control study
152.	Martins P, Valente J, Papoila A L et al (2012) Combined effect of air pollution and house dust mite exposure over the airways. Revista Portuguesa de Imunoalergologia 20(1), 47-57	Study concerned with air pollution with

	STUDY	REASON FOR EXCLUSION
		no separate data for indoor pollutants
153.	Matheson M C, Dharmage S C, Forbes A B, et al . 2003. Residential characteristics predict changes in Der p 1, Fel d 1 and ergosterol but not fungi over time". Clinical and experimental allergy journal of the British Society for Allergy and Clinical Immunology 33(9):1281-8.	Study does not present numeric data that can be used
154.	Matsui EC, Eggleston PA, Buckley TJ, et al (2006) Household mouse allergen exposure and asthma morbidity in inner-city preschool children. Annals of allergy, asthma & immunology : official publication of the American College of Allergy, Asthma, and & Immunology 97(4), 514-20	Study does not report outcome data for all groups
155.	Matsui E C (2014) Environmental exposures and asthma morbidity in children living in urban neighbourhoods. Allergy 69(5), 553-8	Non –systematic overview
156.	Matulonga B, Rava M, Siroux V, et al (2016) Women using bleach for home cleaning are at increased risk of non-allergic asthma. Respiratory medicine 117, 264-71	Cross sectional study
157.	Mazenq J, Dubus J, Gaudart J et al (2017) City housing atmospheric pollutant impact on emergency visit for asthma: A classification and regression tree approach. Respiratory medicine 132, 1-8	Study concerned with outdoor air pollution
158.	McGuinn Laura A, Voss Robert W, Laurent Cecile A, Greenspan Louise C, Kushi Lawrence H, and Windham Gayle C (2016) Residential proximity to traffic and female pubertal development. Environment international 94, 635-641	Odds/risk ratios not reported
159.	Mendy A, Wilkerson J, Salo P M, Cohn R D, Zeldin D C, and Thorne P S (2018) Endotoxin predictors and associated respiratory outcomes differ with climate regions in the U.S. Environment International 112, 218-226	Cross sectional study
160.	Metayer C, Colt JS, Buffler PA, et al (2013) Exposure to herbicides in house dust and risk of childhood acute lymphoblastic leukemia. Journal of exposure science & environmental epidemiology 23(4), 363-70	Case control study and have cohort study on pesticides
161.	Merrett Tg, Burr Ml, Butland Bk, et al (1988) Infant feeding and allergy: 12-month prospective study of 500 babies born into allergic families. Review 53 refs. Annals of allergy 61(6 (Pt 2)), 13-20	Study does not report risk as ratios
162.	Moran S E, Strachan D P, Johnston I D et al (1999). Effects of exposure to gas cooking in childhood and adulthood on respiratory symptoms, allergic sensitization and lung function in young British adults. Clinical and experimental allergy: journal of the British Society for Allergy and Clinical Immunology, 29(8), pp.1033-41.	Study does not report on adjusted data on odds ratio/risk ratio
163.	Morris K, Morgenlander M, Coulehan J L, Gahagen S, and Arena V C (1990) Wood-burning stoves and lower respiratory tract infection in American Indian children. American journal of diseases of children (1960) 144(1), 105-8	Case control study and we have e cohort study on this topic
164.	Moshammer H, Fletcher T, Heinrich J, et al (2010) Gas cooking is associated with small reductions in lung function in children. The European respiratory journal, 36(2), pp.249-54.	Cross sectional study
165.	Munir A K. M, Bjorksten B, Einarsson R, et al (1995) Mite allergens in relation to home conditions and sensitization of	Cross sectional study

	STUDY	REASON FOR EXCLUSION
	asthmatic children from three climatic regions. Allergy: European Journal of Allergy and Clinical Immunology 50(1), 55-64	
166.	Nafstad P, Jaakkola J J. K, Skrondal A et al (2005) Day care centre characteristics and children's respiratory health. Indoor air 15(2), 69-75	Study concerned with outdoor air quality
167.	Nafstad P, Oie L, Mehl R, et al (1998) Residential dampness problems and symptoms and signs of bronchial obstruction in young Norwegian children. American journal of respiratory and critical care medicine 157(2), 410-4	Case control study and have cohort study on dampness
168.	Narayan S, Liew Z, Paul K, et al(2013) Household organophosphorus pesticide use and Parkinson's disease. International journal of epidemiology 42(5), 1476-85	Case control study and have cohort study on pesticides
169.	Nguyen T, Lurie M, Gomez M (2010) The National Asthma Survey--New York State: association of the home environment with current asthma status. Public health reports (Washington, and D.C. : 1974) 125(6), 877-87	Cross sectional study
170.	Nicolaou N, Yiallouros P, Pipis S, et al (2006) Domestic allergen and endotoxin exposure and allergic sensitization in Cyprus. Pediatric allergy and immunology : official publication of the European Society of Pediatric Allergy and Immunology 17(1), 17-21	Case control study and have cohort data on allergen exposure
171.	Norback D, Bjornsson E, Janson C, et al (1999) Current asthma and biochemical signs of inflammation in relation to building dampness in dwellings. The international journal of tuberculosis and lung disease : the official journal of the International Union against Tuberculosis and Lung Disease 3(5), 368-76	Case control study and have cohort study on damp
172.	Norback D, Lampa E, and Engvall K (2014) Asthma, allergy and eczema among adults in multifamily houses in Stockholm (3-HE study)--associations with building characteristics, home environment and energy use for heating. PloS one 9(12), e112960	Cross sectional study
173.	Norback D, Zock J P, Plana E, et al (2017) Building dampness and mold in European homes in relation to climate, building characteristics and socio-economic status: The European Community Respiratory Health Survey ECRHS II. Indoor air 27(5), 921-932	Cross sectional study
174.	Norback D, Zock J-P, Plana E, et al (2011) Lung function decline in relation to mould and dampness in the home: the longitudinal European Community Respiratory Health Survey ECRHS II. Thorax 66(5), 396-401	Study concerned with lung function not symptoms
175.	Oudin A, Segersson D, Adolfsson R, et al . 2018. "Association between air pollution from residential wood burning and dementia incidence in a longitudinal study in Northern Sweden". PLoS ONE 13(6):e0198283.	Study is concerned with indoor and outdoor pollution
176.	Park D-U, Choi Y-Y, Ahn J-J, et al (2015) Relationship between Exposure to Household Humidifier Disinfectants and Risk of Lung Injury: A Family-Based Study. PloS one 10(5), e0124610	Country not similar to UK
177.	Park JH, Gold DR, Spiegelman DL, et al (2001) House dust endotoxin and wheeze in the first year of life. American journal of respiratory and critical care medicine 163(2), 322-8	Study is considered with bacterial endotoxin

	STUDY	REASON FOR EXCLUSION
178.	Paulin L M, Williams D L, Peng R et al (2017). 24-h Nitrogen dioxide concentration is associated with cooking behaviors and an increase in rescue medication use in children with asthma. Environmental research, 159, pp.118-123.	Study does not reported results in a way that can be used
179.	Pekkanen J, Hyvarinen A, Haverinen-Shaughnessy U, et al (2007) Moisture damage and childhood asthma: A population-based incident case-control study. European Respiratory Journal 29(3), 509-515	Case control study and have cohort study on damp
180.	Perera Frederica P (2009) Prenatal airborne polycyclic aromatic hydrocarbon exposure and child IQ at age 5 years. Pediatrics 124(2),	Odds/risk ratios not reported
181.	Perry TT, Wood RA, Matsui EC, et al (2006) Room-specific characteristics of suburban homes as predictors of indoor allergen concentrations. Annals of Allergy, and Asthma and Immunology 97(5), 628-635	Cross sectional study
182.	Perzanowski MS, Chew GL, Divjan A, et al (2013) Early-life cockroach allergen and polycyclic aromatic hydrocarbon exposures predict cockroach sensitization among inner-city children. The Journal of allergy and clinical immunology 131(3), 886-93	Study reports on risk factors for sensitization
183.	Perzanowski MS, Ronmark E, James HR, et al (2016) Relevance of specific IgE antibody titer to the prevalence, severity, and persistence of asthma among 19-year-olds in northern Sweden. The Journal of allergy and clinical immunology 138(6), 1582-1590	Study reports on risk factors for sensitization
184.	Perzanowski MS, Miller RL, Thorne PS, et al (2006) Endotoxin in inner-city homes: associations with wheeze and eczema in early childhood. The Journal of allergy and clinical immunology 117(5), 1082-9	Study is considered with bacterial endotoxin
185.	Peters J L, Levy J I, Rogers C A, et al (2007) Determinants of allergen concentrations in apartments of asthmatic children living in public housing. Journal of Urban Health 84(2), 185-197	Cross sectional study
186.	Phipatanakul W, Celedon JC, Raby BA, et al (2004) Endotoxin exposure and eczema in the first year of life. Pediatrics 114(1), 13-8	Study is considered with bacterial endotoxin
187.	Phipatanakul W, Gold DR, Muilenberg M, Sredl DL, Weiss ST, and Celedon JC (2005) Predictors of indoor exposure to mouse allergen in urban and suburban homes in Boston. Allergy 60(5), 697-701	Cross sectional study
188.	Pogoda J M, and Preston-Martin S (1997) Household pesticides and risk of pediatric brain tumors. Environmental health perspectives 105(11), 1214-20	Case control study and have cohort study data n pesticides
189.	Ponsonby AL, Dwyer T, Kemp A, et al (2003) The use of mutually exclusive categories for atopic sensitization: A contrasting effect for family size on house dust mite sensitization compared with ryegrass sensitization. Pediatric Allergy and Immunology 14(2), 81-90	Study reports on risk factors for sensitization
190.	Poynter JN, Richardson M, Roesler M, et al (2017) Chemical exposures and risk of acute myeloid leukemia and myelodysplastic syndromes in a population-based study. International journal of cancer 140(1), 23-33	Study concerned with occupational exposure to chemicals

	STUDY	REASON FOR EXCLUSION
191.	Quansah R, Jaakkola MS, Hugg TT, et al (2012) Residential dampness and molds and the risk of developing asthma: a systematic review and meta-analysis. PloS one 7(11), e47526	Systematic review
192.	Rabito F A, Carlson J, Holt E W, et al. 2011. "Cockroach exposure independent of sensitization status and association with hospitalizations for asthma in inner-city children". Annals of Allergy, and Asthma and Immunology 106(2):103-109.	Cross sectional study
193.	Ramagopal M, Wang Z, Black K, et al (2014) Improved exposure characterization with robotic (PIPER) sampling and association with children's respiratory symptoms, asthma and eczema. Journal of exposure science & environmental epidemiology 24(4), 421-7	Cross sectional study
194.	Rauh VA, Chew GR, and Garfinkel RS (2002) Deteriorated housing contributes to high cockroach allergen levels in inner-city households. Environ Health Perspect. 110 (Suppl 2): 323–327.	Cross sectional analysis of cohort data
195.	Reding KW, Young MT, Szpiro AA, H et al (2015) Breast Cancer Risk in Relation to Ambient Air Pollution Exposure at Residences in the Sister Study Cohort. Cancer Epidemiology Biomarkers & Prevention 24(12), 1907-1909	Study is not concerned with indoor air
196.	Ren P, Jankun TM, Belanger K, et al (2001) The relation between fungal propagules in indoor air and home characteristics. Allergy 56(5), 419-24	Cross sectional analysis of cohort data
197.	Rios P, Bailey H D, Lacour B, et al (2017) Maternal use of household pesticides during pregnancy and risk of neuroblastoma in offspring. A pooled analysis of the ESTELLE and ESCALE French studies (SFCE). Cancer Causes and Control 28(10), 1125-1132	Pooled analysis of 2 case-control studies
198.	Rokoff LB, Koutrakis P, Garshick E, et al (2017) Wood Stove Pollution in the Developed World: A Case to Raise Awareness Among Pediatricians. Current problems in pediatric and adolescent health care 47(6), 123-141	Systematic review
199.	Rosenbaum PF, Crawford JA, Anagnost SE et al (2010) Indoor airborne fungi and wheeze in the first year of life among a cohort of infants at risk for asthma. Journal of exposure science & environmental epidemiology 20(6), 503-15	Study is concerned with bacterial endotoxin
200.	Rosenfeld L, Chew GL, Rudd R, et al (2011) Are building-level characteristics associated with indoor allergens in the household? Journal of urban health : bulletin of the New York Academy of Medicine 88(1), 14-29	Cross sectional analysis of cohort data
201.	Ruckart PZ, Bove FJ, Shanley E 3rd, et al (2015) Evaluation of contaminated drinking water and male breast cancer at Marine Corps Base Camp Lejeune, North Carolina: a case control study. Environmental health : a global access science source 14, 74	Study is not concerned with indoor air pollution
202.	Sahlberg B, Gunnbjornsdottir M, Soon A et al (2013) Airborne moulds and bacteria, microbial volatile organic compounds (MVOC), plasticizers and formaldehyde in dwellings in three North European cities in relation to sick building syndrome (SBS). The Science of the total environment 444, 433-40	Cross sectional study
203.	Salo P M, Wilkerson J, Rose K M, et al (2018) Bedroom allergen exposures in US households. Journal of Allergy and Clinical Immunology 141(5), 1870	Cross sectional study

	STUDY	REASON FOR EXCLUSION
204.	Sapkota A, Zaridze D, Szeszenia-Dabrowska N et al (2013) Indoor air pollution from solid fuels and risk of upper aerodigestive tract cancers in central and eastern Europe. Environmental research 120, 90-5	Case-control study and have cohort studies on heating fuel
205.	Scelo G, Metayer C, Zhang L, et al (2009) Household exposure to paint and petroleum solvents, chromosomal translocations, and the risk of childhood leukemia. Environmental health perspectives 117(1), 133-9	Case control study and have cohort studies on paint
206.	Schenker MB, Samet JM, and Speizer FE (1983) Risk factors for childhood respiratory disease. The effect of host factors and home environmental exposures. The American review of respiratory disease 128(6), 1038-43	Study does not report results that can be re-used
207.	Schindler C, Keidel D, Gerbase MW, et al (2009) Improvements in PM_{10} exposure and reduced rates of respiratory symptoms in a cohort of Swiss adults (SAPALDIA). American journal of respiratory and critical care medicine 179(7), 579-87	Study does not report results that can be re-used
208.	Seo S, Han Y, Kim J, Choung J T, et al (2014) Infrared camera-proven water-damaged homes are associated with the severity of atopic dermatitis in children. Annals of Allergy, and Asthma and Immunology 113(5), 549-555	Country not similar to UK
209.	Sharpe R A, Bearman N, Thornton C R, et al (2015) Indoor fungal diversity and asthma: A meta-analysis and systematic review of risk factors. Journal of Allergy and Clinical Immunology 135(1), 110-122	Systematic review
210.	Sharpe R A, Thornton C R, Tyrrell J, et al 2015. Variable risk of atopic disease due to indoor fungal exposure in NHANES 2005-2006. Clinical and Experimental Allergy 45(10):1566-1578.	Cross sectional study
211.	Sharpe RA, Thornton CR, Nikolaou V, et al (2015) Higher energy efficient homes are associated with increased risk of doctor diagnosed asthma in a UK subpopulation. Environment international 75, 234-44	Cross sectional study
212.	Sharpe RA, Thornton CR, Nikolaou V, et al (2015) Fuel poverty increases risk of mould contamination, regardless of adult risk perception & ventilation in social housing properties. Environment International 79, 115-129	Cross sectional study
213.	Shenassa ED, Daskalakis C, Liebhaber A, et al (2007) Dampness and mold in the home and depression: An examination of mold-related illness and perceived control of one's home as possible depression pathways. American Journal of Public Health 97(10), 1893-1899	Cross sectional study
214.	Shorter C, Crane J, Pierse N, et al (2017) Indoor visible mold and mold odor are associated with new-onset childhood wheeze in a dose-dependent manner. Indoor Air 28(1), 6-15	Case control study and have cohorts on this topic
215.	Singh U, Levin L, Grinshpun SA et al (2011) Influence of home characteristics on airborne and dust borne endotoxin and beta-D-glucan. Journal of environmental monitoring : JEM 13(11), 3246-53	Study is concerned in bacterial endotoxins
216.	Slater ME, Linabery AM, Spector LG, et al (2011) Maternal exposure to household chemicals and risk of infant leukemia: a report from the Children's Oncology Group. Cancer causes & control : CCC 22(8), 1197-204	Case control study and have cohort studies on chemicals

	STUDY	REASON FOR EXCLUSION
217.	Smedje G, Wang J, Norback D, et al (2017) SBS symptoms in relation to dampness and ventilation in inspected single-family houses in Sweden. International archives of occupational and environmental health 90(7), 703-711	Cross sectional study
218.	Smith B J, Nitschke M, Pilotto L S, et al (2000) Health effects of daily indoor nitrogen dioxide exposure in people with asthma. European Respiratory Journal 16(5), 879-885	Study does not use regression analysis to identify sources of NO_2
219.	Sordillo JE, Hoffman EB, Celedon JC, et al (2010) Multiple microbial exposures in the home may protect against asthma or allergy in childhood. Clinical and experimental allergy : journal of the British Society for Allergy and Clinical Immunology 40(6), 902-10	Study is concerned in bacterial endotoxins
220.	Sordillo J E, Alwis UK, Hoffman E, et al. 2011. "Home characteristics as predictors of bacterial and fungal microbial biomarkers in house dust". Environmental health perspectives 119(2):189-95.	Study concerns with microbial biomarkers in house dust
221.	Spilak MP, Madsen AM, Knudsen SM et al(2015) Impact of dwelling characteristics on concentrations of bacteria, fungi, endotoxin and total inflammatory potential in settled dust. Building & Environment 93, 64-71	Cross sectional study
222.	Sporik R, Holgate ST, Platts-Mills TA, et al (1990) Exposure to house-dust mite allergen (Der p I) and the development of asthma in childhood. A prospective study. The New England journal of medicine 323(8), 502-7	Study does not report results that can be re-used
223.	Squance M L, Reeves G, Attia J, et al (2015) Self-reported Lupus flare: Association with everyday home and personal product exposure. Toxicology Reports 2, 880-888	Case control study and have cohort studies on personal products
224.	Stankovic A, Nikolic M, and Arandjelovic M (2011) Effects of indoor air pollution on respiratory symptoms of non-smoking women in Nis, Serbia. Multidisciplinary respiratory medicine 6(6), 351-5	Country not similar to UK
225.	Strachan D P (1988) Damp housing and childhood asthma: validation of reporting of symptoms. BMJ (Clinical research ed.) 297(6658), 1223-6	Cross sectional study
226.	Strachan D P, and Carey I M (1995) Home environment and severe asthma in adolescence: a population based case-control study. BMJ (Clinical research ed.) 311(7012), 1053-6	Case control study
227.	Strumylaite L, and Kregzdyte R (2006) Household gas cooking and respiratory health in preschool children. Family Medicine and Primary Care Review 8(1), 21-25	Cross sectional study
228.	Taha AA. ER, Etewa SE, Abdel-Rahman SA, et al (2018) House dust mites among allergic patients at the Allergy and Immunology Unit, Zagazig University: an immunologic and serologic study. Journal of Parasitic Diseases 42(3), 405-415	Country not similar to UK
229.	Takeda M, Saijo Y, Yuasa M et al (2009) Relationship between sick building syndrome and indoor environmental factors in newly built Japanese dwellings. International archives of occupational and environmental health 82(5), 583-93	Country not similar to UK
230.	Tavernier G O. G, Fletcher G D, Francis H C et al (2005) Endotoxin exposure in asthmatic children and matched healthy	Cross sectional study

	STUDY	REASON FOR EXCLUSION
	controls: results of IPEADAM study. Indoor air 15 Suppl 10, 25-32	
231.	Tavernier G, Fletcher G, Gee I et al (2006) IPEADAM study: indoor endotoxin exposure, family status, and some housing characteristics in English children. The Journal of allergy and clinical immunology 117(3), 656-62	Cross-sectional study
232.	Tetreault L F, Doucet M, Gamache P, et al (2016) Childhood exposure to ambient air pollutants and the onset of asthma: An administrative cohort study in Quebec. Environmental Health Perspectives 124(8), 1276-1282	Study is not concerned with indoor air pollution
233.	Thorn J, Brisman J, and Toren K. 2001. "Adult-onset asthma is associated with self-reported mold or environmental tobacco smoke exposures in the home". Allergy: European Journal of Allergy and Clinical Immunology 56(4):287-292.	Case-control study and we have cohort studies on mould
234.	Tischer C G, Gref A, Standl M, et al (2013) Glutathione-S-transferase P1, early exposure to mould in relation to respiratory and allergic health outcomes in children from six birth cohorts. A meta-analysis. Allergy 68(3), 339-46	Systematic review
235.	Tischer C, Chen C M, and Heinrich J (2011) Association between domestic mould and mould components, and asthma and allergy in children: a systematic review. The European respiratory journal 38(4), 812-24	Systematic review
236.	Tischer C, Casas L, Wouters IM, et al (2015) Early exposure to bio-contaminants and asthma up to 10 years of age: results of the HITEA study. The European respiratory journal 45(2), 328-37	Study is concerned in bacterial endotoxins
237.	Tischer C G, Hohmann C, Thiering E, et al (2011) Meta-analysis of mould and dampness exposure on asthma and allergy in eight European birth cohorts: an ENRIECO initiative. Allergy 66(12), 1570-9	Systematic review
238.	Tischer C, Weikl F, Probst AJ, et al (2016) Urban Dust Microbiome: Impact on Later Atopy and Wheezing. Environmental health perspectives 124(12), 1919-1923	Study concerned with fungal ddiversity
239.	Trevillian LF, Ponsonby AL, Dwyer T, et al (2003) An association between plastic mattress covers and sheepskin underbedding use in infancy and house dust mite sensitization in childhood: a prospective study. Clinical and experimental allergy : journal of the British Society for Allergy and Clinical Immunology 33(4), 483-9	Study concerned with sensitization
240.	Trupin L, Balmes J R, Chen H et al (2010) An integrated model of environmental factors in adult asthma lung function and disease severity: a cross-sectional study. Environmental health : a global access science source 9, 24	Cross sectional study
241.	Turunen M, Iso-Markku K, Pekkonen M, et al (2017) Statistical associations between housing quality and health among Finnish households with children - Results from two (repeated) national surveys. Science of the Total Environment 574, 1580-1587	Study does not report longitudinal data
242.	Ulrik CS, Backer V, Hesse B, et al (1996) Risk factors for development of asthma in children and adolescents: findings from a longitudinal population study. Respiratory medicine 90(10), 623-30	Study does not report on prognostic factors

	STUDY	REASON FOR EXCLUSION
243.	van Rossem L, Rifas-Shiman SL, Melly SJ, et al (2015) Prenatal air pollution exposure and newborn blood pressure. Environmental health perspectives 123(4), 353-9	Study is not concerned with indoor air pollution
244.	Venn A J, Cooper M, Antoniak M et al (2003) Effects of volatile organic compounds, damp, and other environmental exposures in the home on wheezing illness in children. Thorax 58(11), 955-60	Case-control study and have cohort studies on VOC
245.	Vesper SJ, McKinstry C, Haugland RA, et al (2007) Relative moldiness index as predictor of childhood respiratory illness. Journal of exposure science & environmental epidemiology 17(1), 88-94	Study does not report on risk as an outcome
246.	Viegi G, Paoletti P, Carrozzi L, et al (1991) Effects of home environment on respiratory symptoms and lung function in a general population sample in north Italy. The European respiratory journal 4(5), 580-6	Cross sectional study
247.	Vilcekova S, Apostoloski I Z, Meciarova L et al (2017) Investigation of Indoor Air Quality in Houses of Macedonia. International journal of environmental research and public health 14(1),	Country not similar to UK
248.	Volk HE, Hertz-Picciotto I, Delwiche L, et al (2011) Residential proximity to freeways and autism in the CHARGE study. Environmental health perspectives 119(6), 873-7	Case control study and have cohort studies on proximity to traffic
249.	Volk HE, Lurmann F, Penfold B, et al (2013) Traffic-related air pollution, particulate matter, and autism. JAMA psychiatry 70(1), 71-7	Study is not concerned with proximity to traffic
250.	Volkmer R E, Ruffin R E, Wigg N R et al (1995) The prevalence of respiratory symptoms in South Australian preschool children. II. Factors associated with indoor air quality. Journal of paediatrics and child health 31(2), 116-20	Cross-sectional study
251.	Wallace J, D'Silva L, Brannan J, et al . 2011. "Association between proximity to major roads and sputum cell counts". Canadian respiratory journal 18(1):13-8.	Study concerned with markers of illness
252.	Wang J, Cozen W, Thorne PS, et al (2013) Household endotoxin levels and the risk of non-Hodgkin lymphoma. Cancer causes & control : CCC 24(2), 357-64	Study is concerned in bacterial endotoxins
253.	Wang J, Engvall K, Smedje G, et al (2014) Rhinitis, asthma and respiratory infections among adults in relation to the home environment in multi-family buildings in Sweden. PloS one 9(8), e105125	Cross sectional study
254.	Wang J, Engvall K, Smedje G, et al (2017) Current wheeze, asthma, respiratory infections, and rhinitis among adults in relation to inspection data and indoor measurements in single-family houses in Sweden-The BETSI study. Indoor air 27(4), 725-736	Cross sectional study
255.	Wang L, Hu W, Guan Q et al (2018). The association between cooking oil fume exposure during pregnancy and birth weight: A prospective mother-child cohort study. The Science of the total environment, 612, pp.822-830.	Country not similar to the UK
256.	Ward MH, Colt JS, Deziel NC, et al (2014) Residential levels of polybrominated diphenyl ethers and risk of childhood acute lymphoblastic leukemia in California. Environmental health perspectives 122(10), 1110-6	Case control study and have cohort studies on VOC

	STUDY	REASON FOR EXCLUSION
257.	Ward MH, Colt JS, Metayer C, et al (2009) Residential exposure to polychlorinated biphenyls and organochlorine pesticides and risk of childhood leukemia. Environmental health perspectives 117(6), 1007-13	Case control study and have cohort studies on VOC
258.	Ware J H, Dockery D W, Spiro A, 3rd , Speizer F E, Ferris B G, and Jr (1984) Passive smoking, gas cooking, and respiratory health of children living in six cities. The American review of respiratory disease 129(3), 366-74	Study does not report results that can be re-used
259.	Webb E, Blane D, de Vries , and Robert . 2013. "Housing and respiratory health at older ages". Journal of epidemiology and community health 67(3):280-5.	Study concerned with indicators of poor respiratory health
260.	Wegienka G, Johnson CC, Havstad S, et al (2010) Indoor pet exposure and the outcomes of total IgE and sensitization at age 18 years. Journal of Allergy and Clinical Immunology 126(2), 274	Study did not adjust for confounders
261.	White A J, Teitelbaum SL, Stellman S D, et al (2014) Indoor air pollution exposure from use of indoor stoves and fireplaces in association with breast cancer: a case-control study. Environmental Health: A Global Access Science Source 13(1), 135-158	Case control study and have cohort studies on heating
262.	White AJ, Bradshaw PT, Herring AH, et al (2016) Exposure to multiple sources of polycyclic aromatic hydrocarbons and breast cancer incidence. Environment International 89, 185-192	Case control study and have cohort studies on PAH
263.	Wickens K, Douwes J, Siebers R, et al (2003) Determinants of endotoxin levels in carpets in New Zealand homes. Indoor air 13(2), 128-35	Study is concerned with endotoxins
264.	Wilhelm M, and Ritz B (2003) Residential proximity to traffic and adverse birth outcomes in Los Angeles county, California, 1994-1996. Environmental health perspectives 111(2), 207-16	Case control study and we have cohort studies on proximity to traffic
265.	Wilker Elissa H, Martinez-Ramirez Sergi, Kloog Itai et.al (2016) Fine Particulate Matter, Residential Proximity to Major Roads, and Markers of Small Vessel Disease in a Memory Study Population. Journal of Alzheimer's disease : JAD 53(4), 1315-23	Study concerned with markers of disease
266.	Williamson IJ, Martin CJ, McGill G, et al (1997) Damp housing and asthma: a case-control study. Thorax 52(3), 229-34	Case control study and have cohort studies on damp
267.	Wilson J, Dixon SL, Breysse P, et al (2010) Housing and allergens: a pooled analysis of nine US studies. Environmental research 110(2), 189-98	Systematic review
268.	Wong G W. K, Brunekreef B, Ellwood P et al (2013) Cooking fuels and prevalence of asthma: a global analysis of phase three of the International Study of Asthma and Allergies in Childhood (ISAAC). The Lancet. Respiratory medicine 1(5), 386-94	Data not reported separately for countries similar to the UK
269.	Xu X, and Wang L (1993) Association of indoor and outdoor particulate level with chronic respiratory illness. American Review of Respiratory Disease 148(6 I), 1516-1522	Country not similar to the UK

	STUDY	REASON FOR EXCLUSION
270.	Yang A, Janssen NA, Brunekreef B, et al (2016) Children's respiratory health and oxidative potential of $PM_{2.5}$: the PIAMA birth cohort study. Occupational and environmental medicine 73(3), 154-60	Study did not measure indoor air quality
271.	Yang S I, Kim B J, Kim H B, et al (2015) Prenatal particulate matter/tobacco smoke increases infants' respiratory infections: COCOA study. Allergy, and Asthma and Immunology Research 7(6), 573-582	Country not similar to UK
272.	Zacharasiewicz A, Zidek T, Haidinger G et al (1999) Indoor factors and their association to respiratory symptoms suggestive of asthma in Austrian children aged 6-9 years. Wiener klinische Wochenschrift 111(21), 882-6	Cross-sectional study
273.	Zejda J E, and Kowalska M. (2003). Risk factors for asthma in school children--results of a seven-year follow-up. Central European journal of public health, 11(3), pp.149-54.	Study does not report on adjusted data on odds ratio/risk ratio
274.	Zhang G, Spickett J, Lee A H, et al. 2006. Ever eczema and itchy rash in relation to domestic environments in primary school children. Indoor and Built Environment 15(6):535-541.	Cross sectional study
275.	Zhao Zhiqing, Lin Faying, Wang Bennett, Cao Yihai, Hou Xu, and Wang Yangang (2016) Residential Proximity to Major Roadways and Risk of Type 2 Diabetes Mellitus: A Meta-Analysis. International journal of environmental research and public health 14(1),	Systematic review
276.	Zock JP, Plana E, Anto JM, et al (2009) Domestic use of hypochlorite bleach, atopic sensitization, and respiratory symptoms in adults. Journal of Allergy and Clinical Immunology 124(4), 731	Pollutant not of interest
277.	Zota AR, Aschengrau A, Rudel RA, et al (2010) Self-reported chemicals exposure, beliefs about disease causation, and risk of breast cancer in the Cape Cod Breast Cancer and Environment Study: a case-control study. Environmental health : a global access science source 9, 40	Case control study
278.	Zota A, Adamkiewicz G, Levy JI, et al (2005) Ventilation in public housing: implications for indoor nitrogen dioxide concentrations. Indoor air 15(6), 393-401	Cross sectional study

I.2 Economic studies

No economic evidence review was carried out for this review

Appendix J: Research recommendation

What are the health risks associated with exposure to sources of particulate matter at home?

Population	Adults and children without pre-existing health conditions
Prognostic factors, exposure	health effects associated with exposure to particulate matter • Respiratory health effects • Allergic health effects • Cardiac health effects • Pregnancy related health effects • Cancer health effects
Outcomes	Adjusted risk ratios and odd ratios reported for health risk associated with prognostic factor(s) and the sources particulate matter.
Study design	Cohort study design with multivariate analysis adjusting for variables that might confound results. For example, ingress of outdoor air, presence of damp and mould, presence of open fires or use of gas stoves
Timeframe	At least 1 year follow up

Rationale: Particulate matter (PM) is a complex mixture of solid and/or liquid particles suspended in air. These particles can vary in size, shape and composition and have been linked to poor health outcomes. Indoor PM can be generated through cooking and other combustion activities. Evidence about harms, both in the short and longer term, that may be associated with sources of PM would improve understanding and educate users