NATIONAL INSTITUTE FOR HEALTH AND
CARE EXCELLENCE

Quality standards

Briefing paper: Indoor air quality at home

**Quality Standards Advisory Committee meeting**: 21 July 2021

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1. Introduction

This briefing paper presents a structured overview of potential quality improvement areas for indoor air quality at home. It provides the committee with a basis for discussing and prioritising quality improvement areas for development into draft quality statements and measures for public consultation.

This briefing paper includes a brief description of the topic, a summary of each of the suggested quality improvement areas and supporting information.

Recommendations selected from the key development source are included to help the committee in considering potential statements and measures.

* 1. Development source

The key development sources referenced in this briefing paper are:

[Indoor air quality at home. NICE guideline NG149](https://www.nice.org.uk/guidance/ng149) (2020).

[Excess winter deaths and illness and the health risks associated with cold homes. NICE guideline NG6](https://www.nice.org.uk/guidance/ng6) (2015). Review decision made 2019 not to update this guideline as no new evidence was identified that would impact on recommendations.

1. Overview
	1. Focus of quality standard

This quality standard will cover indoor air quality in residential buildings. NICE has already published a quality standard on [air pollution: outdoor air quality and health](https://www.nice.org.uk/guidance/qs181).

* 1. Description

Outdoor air quality has received much public attention, but people spend up to 90% of their lives indoors and 60% of that time at home. Air quality in the home is affected by indoor air pollutants from many sources, including:

* building materials (including fittings and flooring)
* furniture and furnishings
* consumer products, including household and personal care products
* activities such as cooking and smoking

biological sources, including mould, house dust mites, bacteria, pests and pet dander.

Outdoor air pollutants are also a significant contributor to indoor air quality as they enter through windows or gaps in the building structure.

Poor air quality at home can be a health risk. Exposure to indoor air pollutants including nitrogen dioxide, carbon monoxide, particulates, biological agents and volatile organic compounds (VOCs), is widespread and can cause respiratory and other conditions, and premature death in some people.

The most effective way to deal with indoor pollutants is to either remove the source or reduce emissions from it. If this is not possible, the pollutant can be diluted by ventilation (for example, opening windows) to reduce exposure.

The COVID-19 pandemic has resulted in emphasis on the importance of ventilation to help prevent transmission of coronavirus (see Public Health England’s [ventilation of indoor spaces to stop the spread of coronavirus](https://www.gov.uk/government/publications/covid-19-ventilation-of-indoor-spaces-to-stop-the-spread-of-coronavirus/ventilation-of-indoor-spaces-to-stop-the-spread-of-coronavirus-covid-19)).

* 1. People affected by poor air quality

Everyone can be affected by poor air quality, but some groups are at increased risk of exposure or adverse effects. The main way people are affected is by inhaling pollutants, but they can also be ingested or absorbed through the skin.

People who may be particularly vulnerable to ill health as a result of exposure to poor indoor air quality include:

* people with a pre‑existing health condition such as asthma, allergies, chronic obstructive pulmonary disease and cardiovascular disease
* pregnant women and their unborn babies
* pre-school children
* older people
* people who live in poor-quality housing
* people exposed to tobacco smoke in their homes

people who live in poverty.

Housing conditions can also put people at increased risk of exposure to poor indoor air quality. These include:

* location (external factors such as high levels of outdoor air pollution, or where noise or security risks mean residents do not open windows)
* physical infrastructure (such as small room size, inadequate ventilation and the building's layout and orientation)
* standard of housing (for example, with damp and mould or physical disrepair including flood damage or with unflued or poorly maintained fuel-burning appliances)

overcrowding.

Air pollution in the UK has a significant burden on mortality. [Every breath we take: the lifelong impact of air pollution](https://www.rcplondon.ac.uk/projects/outputs/every-breath-we-take-lifelong-impact-air-pollution) by the Royal College of Physicians and the Royal College of Paediatrics and Child Health estimates there are around 40,000 deaths per year attributable to outdoor air pollution. The economic cost to individuals and society in the UK is estimated to be over £20 billion per year. The impact of indoor air pollution has received less attention. A limited review of the health effects of indoor pollutants in [Every breath we take](https://www.rcplondon.ac.uk/projects/outputs/every-breath-we-take-lifelong-impact-air-pollution) concluded that …”they cause, at a minimum, several thousands of deaths per year in the UK, and are associated with healthcare costs in the order of tens of millions of pounds”.

In 2020, an inquest identified air pollution as a cause of death for the first time in the UK. The coroner issued a regulation 28 report to prevent future deaths based on evidence presented at the inquest. One of the matters of concern was that “the adverse effects of air pollution on health are not being sufficiently communicated to patients and their carers by medical and nursing professionals.” The [Royal College of Physicians (RCP) response](https://www.rcplondon.ac.uk/news/communicating-adverse-effects-air-pollution-health) to the report sets out actions to address this concern. These include working with their members and others to develop resources to facilitate conversations with patients outlining what they might be able to do to reduce indoor air pollution.

* 1. Controlling indoor air quality

No single government department is responsible for indoor air quality. The regulation of air quality indoors and outdoors involves the Ministry of Housing, Communities & Local Government, Department of the Environment, Food and Rural Affairs, the Department of Health, Public Health England, the Health and Safety Executive and the Department for Transport. The Department for Business Energy and Industrial Strategy is responsible for product safety and legislation, which may have an impact on indoor air pollution.

### Policy, legislation and regulation

This section presents the main policy, legislation and regulation for control of indoor air quality at home.

The [Clean Air Strategy 2019](https://www.gov.uk/government/publications/clean-air-strategy-2019) sets out actions required across all parts of government and society to improve air quality including actions to reduce emissions at home. These include:

* raising awareness of the potential impacts of air pollution at home
* reducing the impact of domestic burning (such as changing existing smoke control legislation)
* improving awareness of non-methane VOCs in the home (VOCs are chemicals which evaporate into the air at room temperature) and the importance of effective ventilation to reduce exposure
* informing consumers about the VOC content of everyday products and promoting development of lower VOC content products

consulting on changes to Building Regulations standards for ventilation in homes.

The strategy recognises that “…the current legislative framework has not driven sufficient action at a local level” and proposed a new [Environment Bill](https://bills.parliament.uk/bills/2593) to rectify this. Progress on the bill has since been delayed, but it has now passed from the House of Commons and is with the House of Lords. Whilst the current version of the bill has provisions for national air quality targets, it does not explicitly address indoor air quality.

The [Smoke and carbon monoxide alarm (England) regulations 2015](http://www.legislation.gov.uk/uksi/2015/1693/contents/made) require landlords in the private rented to sector to have carbon monoxide alarms in rented dwellings and make sure they are in working order at the start of each new tenancy. The regulations only require an alarm in rooms containing a solid fuel burning combustion appliance.

The Ministry of Housing, Communities & Local Government addresses indoor air quality through its [Housing health and safety rating system](https://www.gov.uk/government/collections/housing-health-and-safety-rating-system-hhsrs-guidance) (HHSRS) and building regulations. The HHSRS is an evaluation tool to help local authorities identify and protect against potential risks and hazards to health and safety from any deficiencies identified in dwellings. It covers 29 categories of housing hazards including damp and mould growth; asbestos and manufactured mineral fibres; biocides; carbon monoxide and fuel combustion products (nitrogen dioxide, sulphur dioxide and smoke); and VOCs. A comprehensive review of the HHSRS is underway. The [Housing Act 2004 (part 1)](http://www.legislation.gov.uk/ukpga/2004/34/contents) also covers hazards relating to indoor air quality.

Building Regulations set minimum standards for design, construction and alterations buildings. The responsibility for checking that Building Regulations have been met falls to building control bodies either from the local authority or the private sector (as an approved inspector). Only a local authority can enforce compliance with Building Regulations, though. The regulations are supported by ‘approved documents’ providing detailed practical guidance on compliance with the regulations. Most relevant to this quality standard are [Ventilation: approved document F](https://www.gov.uk/government/publications/ventilation-approved-document-f) and [Conservation of fuel and power: approved document L](https://www.gov.uk/government/publications/conservation-of-fuel-and-power-approved-document-l). Ventilation requirements seek to limit the accumulation of moisture, which can lead to mould growth, and pollutants originating within the building. However, performance criteria for indoor air pollutants is limited. Energy efficiency requirements include reducing emission rates from buildings, such as through standards for the airtightness of the building fabric, can have an effect on indoor air quality.

Government has been [consulting on proposals](https://www.gov.uk/government/consultations/the-future-homes-standard-changes-to-part-l-and-part-f-of-the-building-regulations-for-new-dwellings) to amend Part F and Part L of the Building Regulations with changes expected in 2021/22, and to introduce a Future Homes Standard in 2025.

* 1. Housing condition

The [English Housing Survey](https://www.gov.uk/government/collections/english-housing-survey) (EHS) provides information on the housing stock and it’s condition based on the HHSRS. EHS is a national survey of people's housing circumstances and the condition and energy efficiency of housing in England. It consists of two main elements: an interview survey with an annual sample of approximately 13,300 households; and a follow up physical inspection of the dwelling of 6,000 of the participating households together with an inspection of around 200 vacant dwellings.

In 2019, the EHS shows there were 24.4 million homes in England. Most homes (64%) were owner occupied, 19% were privately rented, 7% were owned by local authorities and 10% by housing associations.

HHSRS Category 1 hazards were found in 10% of dwellings and were most prevalent in the private rented sector. A Category 1 hazard is the most serious type of hazard under the HHSRS. Where such a hazard exists, the dwelling fails to reach the statutory minimum standard for housing in England. The proportion of dwellings with a Category 1 hazard has decreased from 21% in 2009.

Information on damp is presented in the EHS. Physical surveys identified that 3% of dwellings had problems with damp, most commonly with condensation or mould. The Private rented dwellings was the tenure that recorded the greatest proportion of homes with damp problems.

* 1. Resource impact

When the [Indoor air quality at home](https://www.nice.org.uk/guidance/ng149) guideline was developed, a resource impact statement was produced which said that:

* the resource impact of implementing any single guideline recommendation in England will be less than £1 million per year (or £1,800 per 100,000 population) and

the resource impact of implementing the whole guideline in England will be less than £5 million per year (or £9,000 per 100,000 population).

Where practice changes as a result of the guideline, there will not be a significant change in resource use. This is because the cost of interventions is generally low and the recommendations mainly support better use of existing resources and pathways. Many of the recommendations also support current best practice and policies.

Making indoor air quality a public health priority will improve people’s health and may also lead to indirect resource savings elsewhere. For example, improving indoor air quality may lead to fewer hospital admissions or GP and community nurse appointments to treat people with asthma.

1. Summary of suggestions
	1. Responses

A topic engagement exercise was first carried out 17/01/20 to 31/01/20. Responses were received from:

* 16 registered stakeholders
* 5 specialist committee members

National Clinical Director for respiratory services.

The topic was then paused as NICE changed priorities in response to the coronavirus pandemic. Following restart, and due to the length of time that had passed, a second topic engagement exercise was carried out 25/05/21 to 08/06/21. Stakeholders were given the opportunity to replace their original comments or submit comments for the first time:

* 6 registered stakeholders submitted first time comments
* 3 stakeholders replaced / updated their original responses
* 13 stakeholders kept their original comments
* 2 specialist committee members updated their original responses
* 3 specialist committee members kept their original comments.

The responses have been summarised in table 1 (see section 3.2) for further consideration by the committee. Full details of all the suggestions provided are given in appendix 2 and 3 for information.

* 1. Priorities for committee discussion

Table 1 Summary of suggested areas for improvement and information available

| Suggested area for improvement | Stakeholder  | In scope | Guideline recs | Current practice evidence  | Existing QS statement | Priority to discuss? |
| --- | --- | --- | --- | --- | --- | --- |
| **Strategic approach** | ASBP, Asthma UK & BLF, NCD, SCM1, SCM2, SCM4 / PHE | Yes | Yes | No | No | **Yes** |
| **Housing assessment referral** | BTS, SCM1, SCM4 / PHE, UKIEG | Yes | Yes | Yes (limited) | No | **Yes** |
| **Identifying people affected by indoor air quality** | Asthma UK & BLF, CETEC, CO Gas Safety, CoGDEM, Flexi-orb, NCD, Policy Connect, PPMT, SCM 5 | Yes | Yes | No | No | **Yes** |
| **Awareness & advice** | Allergy UK, ASBP, ASH, Asthma UK & BLF, BEAMA, CO Gas Safey, CoGDEM, FETAL, Flexi-orb, Fresh, SCM 2, SCM 3, SCM 4 / PHE, UKIEG | Yes | Yes | Yes | No | **Yes** |
| **Building materials and design** |  |  |  |  |  |  |
| * Building and other materials
 | ASBP, Flexi-orb, SCM2, SCM5 | Yes | Yes | No | No | **Yes** |
| * Housing design & ventilation
 | Allergy UK, ASBP, BRE, BEAMA, CETEC, CoGDEM, FETAL, Flexi-orb, NIHE, RCPCH, SCM1, SCM4, SCM 5 | Yes | Yes | Yes | No | **Yes** |
| **Regulations & standards** | Allergy UK, BRE, BTS, CIBSE, SCM2, SCM5 | Yes | Yes | Yes | No | **Yes** |
| **Additional areas** |  |  |  |  |  |  |
| * Evidence base
 | CETEC, CoGDEM, CIBSE, SCM5, TDF | No | No | No | No | **No** |
| * Funding
 | CoGDEM, CO Gas Safety,SCM3 | No | No | No | No | **No** |
| * National body and legislation
 | CO Gas Safety, SCM1, SCM3 | No | No | No | No | **No** |
| * Smoking cessation
 | ASH, Asthma UK & BLF~~,~~ Fresh | No | Yes | No | Yes | **No** |
| * Access to medications / treatments for allergens
 | Allergy UK | No | No | No | No | **No** |

|  |
| --- |
| Table notes:Asthma UK and British Lung Foundation made a joint responseRoyal College of Nursing had no substantive commentsRoyal College of Physicians endorse the response submitted by the British Thoracic SocietyBEAMA is the UK member association for manufacturers and providers of energy infrastructure technologies and systems which include heating & ventilation |
| Abbreviations:ASBP: Alliance for Sustainable Building ProductsASH: Action on Smoking and Health Asthma UK & BLF: Asthma UK and the British Lung Foundation BRE: Building Research EstablishmentBTS: British Thoracic SocietyCIBSE: Chartered Institution of Building Services EngineersCO Gas Safety: Carbon Monoxide & Gas Safety SocietyCoGDEM: Council for Gas Detection and environmental monitoringFETAL: Federation of Environmental Trade Associations LtdFlexi-orb: The Flexible Energy Oversight Registration BodyNCD: National Clinical Director for respiratory servicesNIHE: Northern Ireland Housing ExecutivePPMT: PPM Technology LtdRCPCH: Royal College of Paediatrics and Child HealthSCM1, SCM2, SCM3, SCM5: Specialist Committee MembersSCM4 / PHE: Submission representing Specialist Committee Member & Public Health EnglandTDF: The Dirac FoundationUKIEG: The UK Indoor Environments Group |

1. Suggested improvement areas

Section 4 presents a summary of the suggested improvement areas, with provisional recommendations that may support statement development and information on current UK practice.

* 1. Strategic approach

Stakeholders suggested:

* Embedding a plan for improving indoor air quality into a local authority strategy such as an air quality, health or housing strategy.
* Setting targets for indoor air quality in strategies to help address a lack of data, to establish monitoring, to identify problems and track progress.
* Approaches should target those most vulnerable to the effects of poor indoor air quality, e.g. people with health conditions, those in social housing and the private rental sector.

#### Selected recommendations

NICE’s guideline on Indoor air quality at home (NG149)

1.1.1 Embed a plan for improving indoor air quality in an existing strategy or plan to improve people's health. This could be a general air quality strategy if one exists. Otherwise, for example, include it in a strategy on housing, health and wellbeing, or inequalities.

1.1.2 Ensure the strategy or plan takes account of the housing conditions that put people at increased risk of exposure to poor indoor air quality and especially people who are particularly vulnerable to ill health as a result of such exposure.

1.1.8 Monitor progress against the goals of the strategy. Use audit data (see recommendation 1.1.5) plus the lists in box 1 to identify people who may be vulnerable and properties that are at risk.

#### Current UK practice

No published studies or audits on current practice were identified for this suggested area for quality improvement.

Local authorities are including air quality in their strategies, but it is difficult to get a national overview and indoor air quality is often not covered. Taking one example, Manchester City Council’s [Our Manchester strategy (2016-25)](https://www.manchester.gov.uk/downloads/download/6426/the_manchester_strategy) includes commitments to improve air quality, and they have established an Air Quality Steering Group with representation from Manchester Health and Care Commissioning. The 2018 [Public Health Annual Report for Manchester](http://www.manchester.gov.uk/download/downloads/id/27205/public_health_annual_report_2018_-_a_breath_of_fresh_air.pdf) is about poor air quality. They have also produced a [Greater Manchester Clean Air Plan](https://cleanairgm.com/technical-documents) with other authorities. The main emphasis across all of these, though, is outdoor air quality.

### Issues for consideration

**For discussion:**

* Would having a plan or strategy result in actual improvements in air quality?
* What should a plan or strategy address, and is there a guideline recommendation to support it?
* We cannot specify a target, as there are no guideline recommendations on this.
* Can a meaningful measure be developed?

**For decision:**

* Should this area be prioritised for inclusion in the quality standard?
	1. Housing assessment referral

Stakeholders suggested:

* Improve the process of obtaining a housing assessment for people with health conditions (such as respiratory conditions), or where poor indoor air quality is suspected, by asking them about their housing conditions.
* Create a single point of contact for a health and housing referral service, as a range of professionals or agencies may identify unsatisfactory housing situations.
* Develop tools for a housing assessment which incorporate an indoor air quality assessment.

#### Selected recommendations

NICE’s guideline on Indoor air quality at home (NG149)

1.2.1 Develop a structured process so that health and social care professionals and housing and local authority staff can use existing referral pathways to help people request a housing assessment if poor indoor air quality has been identified or is suspected, for example, by using the housing condition factors in box 1.

1.2.2 Advise health and social care professionals and housing and local authority staff on how to help people request a housing assessment if poor indoor air quality is identified or suspected, for example, by using the housing condition factors in box 1.

1.5.2 If a person has repeated or worsening respiratory symptoms such as a cough or wheezing, ask about their housing conditions. If these are a concern, help them request a housing assessment from the local authority.

1.5.5 Ask about the person's housing conditions. If housing factors are a health concern, for example, because of damp or lack of ventilation, help them request a housing assessment from the local authority.

1.6.1 Update existing standards, for example building regulations, or develop new ones for indoor air quality. Base them on current safe limits set for pollutants in residential developments. See, for example, World Health Organization guidelines on selected pollutants (2010) and dampness and mould (2009), and the Public Health England indoor air quality guidelines for selected VOCs (2019).

#### Current UK practice

The Housing health and safety rating system (HHSRS) is used by local authorities to assess housing conditions. It is a risk-based assessment tool which used by environmental health officers to assess the risk of a hazard in residential housing to the health and safety of occupants or visitors. It can be used to assess private and social rented housing, and also owner-occupied housing. However, most HHSRS work is carried out in relation to private rented housing as this is the sector with the poorest housing standards. Due to criticisms over the way it works, the HHSRS has been reviewed several times by government since it was introduced in 2006[[1]](#footnote-1). Currently, the HHSRS is in the [second phase of a 2-year review](https://www.gov.uk/government/publications/housing-health-and-safety-rating-system-outcomes-of-the-scoping-review/outcomes-of-report-on-housing-health-and-safety-rating-system-hhsrs-scoping-review) which will lead to an update.

The Chartered Institute of Environmental Health (CIEH) surveyed 170 Environmental Health professionals in 2017[[2]](#footnote-2) to get their views on the HHSRS. Responses covered 86 local authorities across England and showed that 97% of respondents supported an update to the HHSRS. 71 individuals made unprompted comments for updates to the evidence or statistics behind the HHSRS, as much of the evidence used in the guidance for the HHSRS was based on examples from the 1990s. 53% of respondents had seen hazards that were “not adequately addressed by the HHSRS. Specific areas highlighted as being in need of an update included damp / mould (and the link to health) and vulnerable groups (as the HHSRS system is focused on the risk to current tenants, with tenants’ vulnerability limited to age as opposed to any health conditions).

### Issues for consideration

**For discussion:**

* For specialist committee members: What is meant by a housing assessment? Is it an assessment using the HHSRS?
* Given concerns around the current HHSRS, would having such an assessment lead to improvements in indoor air quality?
* Are there barriers preventing people from getting a housing assessment?

**For decision:**

* Should this area be prioritised for inclusion in the quality standard?
	1. Identifying people affected by indoor air quality

Stakeholders suggested:

* Local authority and healthcare professionals identifying people most vulnerable to the effects of poor indoor air quality for extra advice and support.
* Mapping to identify areas with those most vulnerable to poor indoor air quality, e.g. areas with high levels of asthma or deprivation.
* Asking about indoor air quality in the home when carrying out annual asthma reviews.
* Providing and using monitoring equipment to identify poor indoor air quality in the home. Specific suggestions included monitoring aerosols and gases in kitchens, using carbon monoxide monitors and measuring carbon dioxide.

#### Selected recommendations

NICE’s guideline on Indoor air quality at home (NG149)

1.1.5 Encourage the use of existing home visits to identify poor indoor air quality. For example, visits to people's homes by housing officers, environmental health practitioners, community health services, social workers, care workers, and fire and rescue services.

1.1.6 Encourage the use of local inspection protocols to identify poor indoor air quality during home visits. This may include visual inspections, checklists and the monitoring of pollutant levels. Use this information to identify other homes that may be at increased risk of poor indoor air quality.

1.5.2 If a person has repeated or worsening respiratory symptoms such as a cough or wheezing, ask about their housing conditions. If these are a concern, help them request a housing assessment from the local authority.

1.5.5 Ask about the person's housing conditions. If housing factors are a health concern, for example, because of damp or lack of ventilation, help them request a housing assessment from the local authority.

#### Current UK practice

No published large-scale studies or audits on current practice were identified for this suggested area for quality improvement. At present there is little data gathered on indoor air quality in buildings[[3]](#footnote-3).

In 2019, the EHS reported that 44% of dwellings had a carbon monoxide alarm. This type of alarm detects a single pollutant, and sounds when a specified level has been reached. Some also have digital displays which indicate the level of carbon monoxide.

### Issues for consideration

**For discussion:**

* Is the focus about identifying homes with poor indoor air quality or about identifying people in homes whose health is affected by poor indoor air?
* Is there overlap with section 4.2, as some of the actions in the recommendations above involve getting a housing assessment?
* Statements could be difficult to measure if they are based on guideline recommendations that say ‘Encourage’.

**For decision:**

* Should this area be prioritised for inclusion in the quality standard?
	1. Awareness and advice

Stakeholders suggested:

* Education and improving awareness of healthcare commissioners, clinicians, public health professionals and GPs; policy makers; commissioners, including housing and environmental services; residents, landlords, owners, tenants; and the public.
* Improve awareness of the impact of poor housing, ventilation, pollutants and allergens on health; dangers of carbon monoxide and other toxic products of combustion; causes of poor indoor air quality; ways of improving indoor air quality; and preventing, mitigating and repairing dampness.
* Improve awareness through education programmes; training for healthcare professionals; training for registered gas engineers; using social media; using TV messages; communicating through product manufacturers; through local authority staff who visit people in their homes (including housing, healthcare and social care professionals); by providing advice at routine health appointments.

Keeping homes free from tobacco smoke.

#### Selected recommendations

NICE’s guideline on Indoor air quality at home (NG149)

1.3.1 Use existing communication strategies to ensure members of the public and relevant professionals (those involved in planning, designing, building, renovating and maintaining homes) are aware of:

* the causes of poor indoor air quality
* how residents' activities can affect indoor air quality
* how health is affected by poor indoor air quality
* who is particularly vulnerable.

1.3.2 Use existing professional development opportunities to ensure local authority staff who visit people in their homes (such as housing, healthcare and social care professionals):

* know about the sources of indoor air pollutants and how they can affect health
* can give general advice on how to avoid activities that increase the level of indoor air pollutants
* can give general advice on how to improve ventilation if the source of the pollutant cannot be controlled
* are aware that affordability may be a barrier to effective and efficient heating and ventilation
* know that tenants may not be allowed to repair or alter building fabric, fixtures or fittings
* know who can provide help with repairs and necessary improvements (for example, the local authority or a home improvement agency)
* can advise people on how to request a housing assessment.

1.4.1 Advise people on how to reduce damp and condensation and prevent mould. For example, by:

* using background ventilation (such as trickle vents, or whole-house mechanical ventilation systems).
* using mechanical ventilation (such as extractor fans), and opening windows where possible and safe to provide temporary increased ventilation
* avoiding moisture-producing activities (such as air-drying clothes) indoors if possible, or improving ventilation if these cannot be avoided
* repairing sources of water damage and ensuring that residual moisture is removed.

1.4.2 Advise people on how to use trickle vents correctly.

1.4.3 Tell people that the following activities may lead to poor indoor air quality and that they should think about increasing ventilation (by using extractor fans in the bathroom or kitchen, or opening windows if possible and safe):

* using cookers, especially gas cookers
* using open solid-fuel fires
* using candles
* using free-standing gas heaters
* using cleaning products, household sprays or aerosols and paints
* having a bath or shower
* air-drying clothes in the home.

1.4.6 Advise people not to use unflued paraffin heaters in the home.

1.4.7 Advise people to follow the product instructions when using, for example, candles, paints, glues and solvents, to minimise exposure to pollutants.

1.4.10 Advise people not to use gas cookers to heat a room.

1.4.11 Encourage people not to smoke in the home.

1.5.1 Explain that indoor air pollutants (including nitrogen dioxide, damp, mould, particulate matter and VOCs) can trigger or exacerbate asthma, other respiratory conditions or cardiovascular conditions.

1.5.6 Advise women who are pregnant that they are at increased risk of ill health from exposure to poor indoor air quality. Advise people who care for babies under 12 months old that the baby is at increased risk. Both groups should:

* reduce their use of household sprays, air fresheners and other aerosols, and always follow product instructions
* if possible, avoid or reduce activities that produce particulate matter such as using open solid-fuel fires or candles
* always keep the room well ventilated during these activities.

1.5.7 (for healthcare professionals) Explain that other people's tobacco smoke is a risk to a woman who is pregnant and her baby, before and after birth. Advise not smoking in the home or around the woman and her baby.

NICE guideline on stop smoking interventions and services (NG92)

1.9.6 Encourage and train healthcare professionals to ask people about smoking and to advise them of the dangers of exposure to secondhand smoke.

NICE guideline on Smoking: stopping in pregnancy and after childbirth (PH26)

7 Recommend not smoking around the pregnant woman, mother or baby. This includes not smoking in the house or car.

NICE guideline on Asthma: diagnosis, monitoring and chronic asthma management (NG80)

1.10.1 For adults, young people and children aged 5 and over with a diagnosis of asthma (and their families or carers if appropriate):

* Offer an asthma self-management programme, comprising a written personalised action plan and education.
* Explain that pollution can trigger or exacerbate asthma, and include in the personalised action plan approaches for minimising exposure to indoor and outdoor air pollution.

#### Current UK practice

The Royal College of Physicians and the Royal College of Paediatrics and Child Health published a report based on a systematic review of indoor pollution and conversations with children, young people and families which said that ‘there is little public awareness of the potential risks and causes of poor indoor air quality’[[4]](#footnote-4).

Global Action Plan (the charity which co-ordinates Clean Air Day) in partnership with Opinium commission a UK wide Clean Air Public Insight Tracker (CAPIT) to provide information on public awareness and attitudes to air quality. Quarterly surveys are carried out. The [CAPIT December 2020](https://www.globalactionplan.org.uk/clean-air-public-insight-tracker-december-2020) survey included questions on indoor air and covered a sample of 2,002 adults.

The survey reported that 72% of respondents thought that their health was ‘impacted by’ indoor air pollution, with 12% feeling it has a ‘major impact’. This compares to 80% of respondents who thought that outdoor air pollution affected their health. The health issues most thought to be associated with indoor air pollution were respiratory related: worsening of asthma symptoms (37% of respondents); development of asthma (32% of respondents); and lung cancer (30% of respondents).

35% of respondents agreed with a statement that they knew where to get information and advice ‘about the impact of air pollution on me and my family’s health’.

The main contributors to indoor air pollution were identified as smoking (by 41% of respondents); mould (27% of respondents) and indoor open fire (24% of respondents). The survey also explored people’s views on ways to reduce indoor air pollution and asked if they actively did so (Table 2).

Table 2 Responses to CAPIT survey question: Which of the following, if any, do you think are effective ways to reduce levels of indoor pollution?

|  |  |  |
| --- | --- | --- |
| **Way to reduce indoor air pollution** | **% of respondents who think this is an effective method** | **% who actively do so to reduce pollution** |
| Opening the window | 53% | 54% |
| Making sure my boiler is well-maintained (e.g. annual service) | 49% | 45% |
| Avoid smoking in the house | 43% | 33% |
| Using an extractor fan in the kitchen and/or the bathroom | 39% | 36% |
| Keeping dust levels low | 35% | 29% |
| Not using a solid fuel stove or open fire | 30% | 21% |
| Using natural/eco air fresheners and/or cleaning products | 27% | 14% |
| Using low emission (labelled low VOC) paints, varnishes and glues (e.g. when decorating, crafting) | 26% | 14% |
| Using fragrance free or naturally scented (e.g. without artificial ingredients) personal care products | 22% | 13% |
| Burning smokeless fuel/dry, well-seasoned wood on my open fire/stove | 20% | 8% |
| Choosing low emission carpets and/or furniture | 17% | 6% |
| Something else (please specify) | 0% |  |
| Don’t know | 8% |  |
| N/A - I don’t think there are any effective ways to reduce the levels of indoor pollution | 6% |  |

Changes in children's exposure to secondhand tobacco smoke in England have been studied since 1998 using evidence from the Health Survey for England (Jarvis and Feyerabend[[5]](#footnote-5)). Results covering 37,038 children from 1998 to 2012 showed that by 2012, 87% of children lived in a home that was smoke free. 61% of children lived in smoke free homes when one or both parents smoked. Over time, children's exposure to secondhand smoke has declined by 79% since 1998, with continuing progress since smoke free legislation in 2007. The authors concluded that an emerging social norm in England has led to the adoption of smoke free homes not only when parents are non-smokers, but also when they smoke

Exposure of adults to other people’s smoke is reported in the 2017 [Health Survey for England](https://digital.nhs.uk/data-and-information/publications/statistical/health-survey-for-england/2017), based on interviews with a sample of 7,997 adults. The results showed that 24% of adults aged 16 and over self-reported being exposed to other people’s smoke in most weeks. In terms of location, 8% reported being exposed to other people’s smoke at their own home and 6% at other people’s homes.

### Issues for consideration

**For discussion:**

* General awareness campaigns are outside the scope of a quality standard. However, statements can be written about specific advice.
* What group should be targeted for advice?
* What is the most important advice to give?
* Who would give the advice?

**For decision:**

* Should this area be prioritised for inclusion in the quality standard?
	1. Building materials and design

#### Building and other materials

Stakeholders suggested:

* Labelling of consumer products to identify impacts on indoor air quality. This would raise awareness and change their use. Suggested products include cleaning products, aerosols, candles, cosmetics, paints and solvents, domestic fuels, and furnishings.
* Labelling of building materials to identify impacts on indoor air quality for use by building designers and contractors.
* Use of breathable insulation to prevent damp and mould.

#### Selected recommendations for building and other materials

NICE’s guideline on Indoor air quality at home (NG149)

1.4.3 Tell people that the following activities may lead to poor indoor air quality and that they should think about increasing ventilation (by using extractor fans in the bathroom or kitchen, or opening windows if possible and safe):

* using cleaning products, household sprays or aerosols and paints

1.4.8 Advise people to choose low-emission materials (for example, products with a low volatile organic compound [VOC] or formaldehyde content and emissions) if furniture or flooring needs replacing.

1.7.1 Consider specifying building materials and products that only emit a low level of formaldehyde and VOCs. Use existing labelling schemes or other available information on product emissions (for example, on product labels) to make these specifications.

1.8.2 Use materials that emit a low level of formaldehyde and VOCs as specified. If materials need to be substituted, only use products with the same or lower emission levels.

1.9.6 Advise property managers and landlords to:

* use low-pollutant-emission items when replacing furniture or flooring (for example, furniture or flooring with a low formaldehyde content and emission)
* ensure rooms are well ventilated and that the manufacturer's guidelines for use of materials are followed
* ensure there is adequate ventilation provision before installing a new cooker (especially a gas cooker).

#### Current UK practice for building and other materials

No current practice information has been identified.

#### Housing design and ventilation

Stakeholders suggested:

* Using design and layout of a building and ventilation to help reduce airborne spread of COVID-19.
* Designing homes to ventilate naturally where possible to improve indoor air quality, but use mechanical ventilation systems which filter or treat air where outdoor levels of pollution are high.
* Correct specification and installation of mechanical ventilation to improve air quality (as incorrect choices can result in lack of use and reduce quality of indoor air).
* Servicing and maintenance of ventilation systems to maintain effectiveness and prevent nuisance running.
* Addressing adverse impacts on air quality from designing for energy efficiency and retrofitting of energy efficiency measures.
* Use of filters with ventilation systems to prevent outdoor air pollutants entering a house.
* Measurement of ventilation rates.
* Maintenance of hob hoods.

#### Selected recommendations for housing design and ventilation

NICE’s guideline on Indoor air quality at home (NG149)

1.4.4 Advise private and social tenants to contact their landlord if:

* ventilation is not adequate (for example, if the ventilation system is not working, trickle vents are blocked or damaged, extractor fans in the kitchen or bathroom are not working, or if excessive noise from the fans discourages their use)
* repairs are needed to prevent water from entering their building

improvements to heating or insulation are needed to prevent condensation.

1.7.3 Adopt a whole-building approach to heating and ventilation to ensure indoor air quality is maintained while achieving standards for energy use.

1.7.5 Design ventilation systems to reduce or avoid exposure to outdoor air pollution. For example:

* ensure windows that open face away from sources of outdoor air pollution, such as busy roads

fit mechanical systems with filtration to protect against outdoor pollutants.

1.7.6 When building dwellings or refurbishing them to improve thermal performance, ensure there is permanent, effective ventilation.

1.8.3 Ensure all heating and ventilation is installed and commissioned in accordance with the manufacturer's instructions and meets building regulation requirements.

1.9.2 Where a housing assessment has identified problems in private or public rented housing that may contribute to poor indoor air quality, ensure the property has:

* heating appliances and ventilation systems that:
	+ comply with design and performance requirements
	+ are correctly installed and tested
	+ keep properties warm and ventilated without excessive heat loss or draughts
* ventilation that prevents the build‑up of pollutants, including:
	+ trickle vents
	+ working mechanical ventilation systems, such as extractor fans, in bathrooms and kitchens
	+ windows that open (but not onto busy roads or other major sources of outdoor air pollution)

1.9.4 Advise property managers and landlords to:

* develop and undertake maintenance programmes for heating and ventilation systems

provide clear, easy-to-understand instructions telling residents how to use the heating and ventilation systems effectively.

NICE guideline on excess winter deaths and illness and the health risks associated with cold homes (NG6)

12 Building control officers, housing officers, environmental health officers and trading standards officers should:

* Ensure changes to buildings are carried out at least to the standards required by building regulations, in particular with respect to ventilation.
* Use existing powers to identify housing (particularly in the private rented sector) that may expose vulnerable residents the cold. Existing powers fall under both the housing health and safety rating system and trading standards legislation (in relation to energy performance certificates).

Ensure any relevant problems are addressed.

#### Current UK practice for housing design and ventilation

The [English Housing Survey 2017: stock condition](https://www.gov.uk/government/collections/english-housing-survey) report provides information on ventilation. In 2017, 154,000 dwellings (less than 1% of the housing stock) had problems with room ventilation in one or more of the surveyed rooms. Inadequate ventilation is where windows are permanently fixed (painted, screwed or nailed shut) and there is no other adequate form of ventilation to the room. 26% of homes with inadequate ventilation had damp compared with just 4% of other dwellings. Almost half of dwellings did not have working extractor fans in the kitchen or bathroom.

The [English Housing Survey 2018: energy report](https://www.gov.uk/government/statistics/english-housing-survey-2018-energy-report) found that 99% of dwellings had windows that can be opened and 45% of dwellings had a trickle vent (small opening in window frame) in at least one room. It also reported that 1% of dwellings had mechanical ventilation systems (these were mostly flats).

The Ministry of Housing, Communities and Local Government published [a study of ventilation and indoor air quality in new homes](https://www.gov.uk/government/publications/ventilation-and-indoor-air-quality-in-new-homes) in 2019. 80 homes were studied in 2015/16 across seven developments within England. 55 of the homes were naturally ventilated (using trickle vents, kitchen extractor fans etc.); 25 homes had decentralised mechanical extract ventilation systems. Interviews were also undertaken with residents to understand indoor pollutant sources, their ventilation behaviour and their perception of indoor air quality in their home.

The results of the study showed poor indoor air quality in some of the monitored homes. Failure to meet indoor air quality indicators corresponded with failure to meet the building regulation ventilation recommendations. In relation to building regulations approved document F:

* Naturally ventilated homes: Only 2 of the 55 homes met the guidance with respect to both trickle ventilator provision and intermittent extract fan air flow rates.
* Homes with continuous mechanical extract: Only 1 of the 25 homes met the guidance with respect to both continuous extract fan air flow rates and trickle ventilator provision.

In relation to indoor air quality, the ventilation provisions in the monitored homes were appropriate for controlling internal emissions of nitrogen dioxide and carbon monoxide. However, the study highlighted issues around the ventilation of internal emissions of moisture, bio-effluents (body odour) and volatile organic compounds.

A conflict between noise and the use of the ventilation system was also identified. Concerns were raised by residents from extract fans which resulted in both intermittent and continuous fans not being operated, which could potentially lead to long-term under-ventilation consequences for those homes. Some residents also reported problems with the ingress of external noise, such as where there is a main road at the front of the home. In this case, there was a tendency to close the trickle ventilators to reduce the ingress of noise.

### Issues for consideration

**For discussion:**

* There are no guideline recommendations on new labelling for products, but there are recommendations for using low emission products.
* The suggestions and recommendations on ventilation cover a wide area.
* To develop a statement, clarity is needed on:
	+ The priority for improvement.
	+ The key action that will lead to improvement.
	+ The specific audience or setting.

**For decision:**

* Should this area be prioritised for inclusion in the quality standard?
	1. Regulations & standards

Stakeholders suggested:

* Standards for new build housing for heating and ventilation to meet WHO/PHE guidelines.
* Standards for indoor air quality and a system of indoor air quality ratings for buildings.
* Improved ventilation standards to maintain good indoor air quality rather than control moisture.
* Post-construction air quality measurements.
* Post construction testing to ensure compliance with building regulations.
* Standards for air quality sensors, instruments and purification systems.
* Building regulation requirements for existing homes where works are carried out to address impact on whole building and to improve air quality.
* Building regulations to reduce risk factors associated with allergy and respiratory disease.

#### Selected recommendations

NICE’s guideline on Indoor air quality at home (NG149)

1.6.1 Update existing standards, for example building regulations, or develop new ones for indoor air quality. Base them on current safe limits set for pollutants in residential developments.

1.6.2 Use existing building regulation enforcement activities to improve indoor air quality. Ensure enforcement takes place within the specified timelines.

NICE’s guideline on excess winter deaths and illness and the health risks associated with cold homes (NG6)

12 Building control officers, housing officers, environmental health officers and trading standards officers should:

* Ensure changes to buildings are carried out at least to the standards required by building regulations, in particular with respect to ventilation.
* Use existing powers to identify housing (particularly in the private rented sector) that may expose vulnerable residents the cold. Existing powers fall under both the housing health and safety rating system and trading standards legislation (in relation to energy performance certificates).

Ensure any relevant problems are addressed.

#### Current UK practice

No large-scale studies of current practice were identified. The Ministry of Housing, Communities and Local Government [study of ventilation and indoor air quality in new homes](https://www.gov.uk/government/publications/ventilation-and-indoor-air-quality-in-new-homes) showed that the vast majority of 80 homes studied failed to meet the building regulation ventilation recommendations following construction.

There appears to be consensus that existing building regulations are inadequate for dealing with indoor air quality. The Royal College of Physicians and the Royal College of Paediatrics and Child Health have recommended revisions to building regulations to set legally binding performance standards for indoor air quality; to conduct air quality tests when construction is complete; and to check compliance after construction and assess buildings once they are occupied[[6]](#footnote-6). The government also [consulted on proposals](https://www.gov.uk/government/consultations/the-future-homes-standard-changes-to-part-l-and-part-f-of-the-building-regulations-for-new-dwellings) to amend Part F and Part L of the Building Regulations with changes expected in 2021/22, and to introduce a Future Homes Standard in 2025.

### Issues for consideration

**For discussion:**

* Quality statements cannot replicate actions or procedures that are mandatory.
* If existing building regulation are not being met, and the NICE guideline does not specify standards for indoor air quality, is there value in saying others should set new standards?
* Could the update to building regulations address some of the issues raised around inadequate standards, adherence and testing?
* Is the time right to introduce other standards if national building regulations and transitional arrangements are being developed?

**For decision:**

* Should this area be prioritised for inclusion in the quality standard?
	1. Additional areas

### Summary of suggestions

The improvement areas below were suggested as part of the stakeholder engagement exercise. However, they were felt to be either unsuitable for development as quality statements, outside the remit of this particular quality standard referral or need further discussion by the committee to establish potential for statement development.

There will be an opportunity for the committee to discuss these areas at the end of the Advisory Committee meeting.

Table 3 Summary of information available for additional areas

| Suggested area for improvement | Within remit of NICE QS | In scope | Guideline recs | Relevant existing QS  |
| --- | --- | --- | --- | --- |
| Evidence base | No | No | No | No |
| Funding | No | No | No | No |
| National bodies and legislation | No | No | No | No |
| Smoking cessation | Yes | No | No | Yes |
| Access to medications / treatments for allergens | Yes | No | No | No |

### Evidence base

Suggestions included developing an evidence base or guidance relating to energy efficient policies; factors which combined to affect indoor air quality; collection of indoor air quality data in homes; indicators for microbial pollution; kitchen pollutant studies; the location of new homes; and the relationship between overheating and indoor pollutants. This area has not been progressed because additional evidence and guidance is outside of the remit of quality standards. Suggestions for additional guidance will be passed on to the NICE centre for guidelines.

### Funding

A levy to raise funds for carbon monoxide alarms, raising awareness, providing training and funding for low-income households to help reduce exposure to indoor air pollutants were suggested. Funding is outside of the remit of quality standards.

### National bodies and legislation

A cross-government body to lead and coordinate indoor air quality policy; testing for carbon monoxide as a cause of death; making carbon monoxide alarms mandatory in rental properties; the governments update of the current HHSRS to include indoor air quality and national registration of appliances and installers were suggested by stakeholders. Quality standards focus on areas for quality improvement that can be addressed by local commissioners. National bodies and legislation are outside the scope of quality standards.

### Smoking cessation

Stakeholders suggested helping tobacco smokers to quit. NICE quality standards [smoking: supporting people to stop](https://www.nice.org.uk/guidance/qs43); [smoking: reducing and preventing tobacco use](https://www.nice.org.uk/guidance/qs82); and [smoking: harm reduction](https://www.nice.org.uk/guidance/qs92) already cover helping people to stop smoking.

### Access to medications / treatments for allergens

Improving access to medications / treatments such as biologic therapies and immunotherapy for allergens to reduce the effects was suggested. This is outside of the scope of this quality standard (indoor air quality in residential buildings).

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# Appendix 1: Suggestions from stakeholder engagement exercise – registered stakeholders

**General comments**

| **ID** | **Stakeholder** | **Comment** |
| --- | --- | --- |
| G1 | Royal College of Nursing | No comments to submit. |
| G2 | Royal College of Physicians | We would like to endorse the response submitted by the British Thoracic Society (BTS). |

**Strategic approach**

| **ID** | **Stakeholder** | **Key area for quality improvement** | **Why is this important?** | **Why is this a key area for quality improvement?** | **Supporting information** |
| --- | --- | --- | --- | --- | --- |
| 1 | Alliance for Sustainable Building Products | Monitoring of iaq [indoor air quality] | We have very little data on iaq in the UK and until we have better data sets, it is difficult to advance; | It’s impossible to set targets, without more monitoring and data | There is mention of iaq monitoring in the Guidance Notes for the Building Regulations Part F but this relates to post construction but pre-occupation. It would be possible to include in Regs, much like air tightness testing |
| 2 | Asthma UK and British Lung Foundation | Ensure all local authorities set targets to improve indoor air quality through monitoring in their local strategyNICE develop a system for monitoring the number of local authorities who prioritise indoor air quality in their local strategy | Local authorities have the regulatory powers to mandate standards for indoor air quality and should use this to help improve health outcomes in their areas. | Ensuring housing is fit for habitation and not a risk to the occupant’s health can only be achieved if local authorities have set improving indoor air quality as an objective in their Air Quality Plans as part of their local strategy. Local Authorities and housing providers should offer indoor air quality testing for their residents.Local Authorities should establish a process or portal for residents to report potential problems with indoor air quality and access services. | Local Air Quality Plans  |
| 3 | NCD | Priority areas relating to indoor air quality at home are … Community Acquired Pneumonia incidence and severity |  |  |  |
| 4 | NCD  | Priority areas relating to indoor air quality at home are … Improving outcomes for asthma, i.e. exacerbations (measured by OCS use), control (measured by PROM/SABA use) and unscheduled healthcare utilization. |  |  |  |
| 5 | NCD  | Priority areas relating to indoor air quality at home are … COPD exacerbations and unscheduled healthcare utilizations |  |  |  |
| 6 | SCM1 | Embed a plan for improving indoor air quality in an existing strategy or plan to improve people's health. This could be a general air quality strategy if one exists. Otherwise, for example, include it in a strategy on housing, health and wellbeing, or inequalities. | By including indoor air quality in a strategy, it will raise the profile and provide a link between indoor air quality and other important areas of work such as improving poor housing conditions, reducing poverty, dealing with cold homes as well as embedding in strategies to improve the energy efficiency of the housing stock.  | A wider strategic approach can take into account the range of factors that can contribute to poor indoor air quality. Ensures a broader view.  |  |
| 7 | SCM2 | Social housing/ private rental sector indoor air quality  | IAQAH is worse on average in the social housing and private rental sector (than owner occupied housing). Social housing/private rental sector occupants are also more likely to be susceptible to negative health impacts of poor IAQAH (owing to greater share of older people, children, and lower income households).Hence, the greatest priority to addressing IAQAH should be to the social housing and private rental sector. | IAQAH measures must target those at greatest likelihood and risk of poor IAQAH, predominantly those in social housing and the private rental sector. | NICE Indoor air quality at home Guideline, January 2020; NICE Indoor air quality at home: [A] Evidence reviews for indoor air quality at home: Cost effectiveness outcomes, March 2019;RCPCH The inside story: Health effects of indoor air quality on children and young people, January 2020 |
| 8 | SCM4/PHE | Develop and embed a plan for improving indoor air quality in an existing strategy or plan to improve people's health. This could be a general air quality strategy, if exists.Monitor progress against the goals of the strategy. | This is a recommendation in the NICE guideline on indoor air quality at home. There is evidence that shows that exposure to poor indoor air quality is linked to a range of healthproblems. These include respiratory conditions such as a cough, wheezing or asthma, and allergic symptoms such as a runny nose or eye irritation. | Local authorities have a duty to ensure both public sector and private homes are maintained to a 'decent' standard and are responsible for ensuring people's health and wellbeing. Currently, there is not an IAQ strategy embedded on air quality or health related strategies of Local Authorities.  | NICE guideline NG149 |

**Housing assessment referral**

| **ID** | **Stakeholder** | **Key area for quality improvement** | **Why is this important?** | **Why is this a key area for quality improvement?** | **Supporting information** |
| --- | --- | --- | --- | --- | --- |
| 9 | British Thoracic Society | Raise awareness and optimise the pathway for housing assessment of people with health condition particularly and poor indoor quality suspected. | Children, young people and adults with chronic respiratory conditions with repeated or worsening respiratory symptoms should be asked about their housing conditions.If these are a concern, they are helped to request a housing assessment from the local authority |  |  |
| 10 | SCM1 | Single point of contact health and housing referral service | Persons vulnerable to poor indoor air quality may be in contact with agencies for other reasons who may find out their housing situation is unsatisfactory | Multi-agency and partnership working to ensure people get all the help they can get.  | NICE Guideline Preventing Excess Winter Deaths and illness associated with cold homes |
| 11 | SCM4/PHE | Develop new tools / improve current tools for a housing assessment that include a scientific and cost effective IAQ assessment.  | NICE guideline on indoor air quality at home recommends ‘referrals for a housing assessment’ (recommendation 1.2) where poor indoor air quality has been identified or suspected. | As it was identified by the UK Indoor Environments Group (UKIEG), there are a range of potential IAQ problems and an appropriate assessment method should be available for local authorities and Environmental Health Officers. | Standards for monitoring of a range of indoor air quality parameters should be part of a framework for protocol/ guidance on undertaking an IAQ assessment.Guidance on monitoring indoor environmental quality is *in preparation* by CIBSE.Guidance on monitoring indoor air quality will be published soon from the Institute of Air Quality Management. |
| 12 | UKIEG | Develop appropriate tools for a housing assessment that incorporate a standardised IAQ assessment method which is scientifically sound but also cost effective in non-research settings. | NICE guideline NG149 recommends ‘referrals for a housing assessment’ (recommendation 1.2) where there are IAQ/Health concerns.  | There are a range of potential IAQ problems and an appropriate assessment method should be available for local authorities and their contractors. There should be clarity on who will provide that guidance. | British standard and ISO standards are available for measurement of a range of indoor air quality parameters and should form part of a framework for guidance on undertaking an IAQ assessment. Additional information such as guidance on recording and assessing occupant perceptions and household characteristics as well as types and limitations of available techniques should also be made available. |

**Identifying people affected by indoor air quality**

| **ID** | **Stakeholder** | **Key area for quality improvement** | **Why is this important?** | **Why is this a key area for quality improvement?** | **Supporting information** |
| --- | --- | --- | --- | --- | --- |
| 13 | Asthma UK and British Lung Foundation | Monitoring to reduce inequality within local areas through identifying those who are at risk of poor health due to poor indoor air quality in their home1. Inequality is closely linked to asthma as well as poor indoor air quality. In measuring inequality in a local area, CCGs, local authorities and GPs can work together to identify those who are most at risk of exposure to poor indoor air quality as part of a Joint Strategic Needs Assessment.

Mapping areas of deprivation within a community and running indoor air quality assessments within local areas will help the local authority and healthcare professionals operating in that community to identify the most vulnerable patients who will be in need of extra advice and support with managing the indoor air quality in their home | We know that asthma is more prevalent within more deprived communities, and those living in more deprived areas of England are more likely to go to hospital for their asthma. In 2012, incidence rates of asthma were 36% higher in the most deprived communities than in the least deprived.Those from disadvantaged socio-economic groups are also more likely to be exposed to the causes and triggers of asthma, such as smoking and air pollution.The Asthma UK Annual Asthma Survey 2019 (unpublished) found that the following percentage of people with asthma were triggered by these indoor air pollutants:* 60% dust
* 53% secondhand smoking
* 44% cleaning products
* 39% moulds and fungi
* 30% pets
* 42% perfumes and aerosols

Children growing up in homes with mould are between one and a half and three times more prone to coughing and wheezing - symptoms of asthma and other respiratory conditions. | NHS England and Clinical Commissioning Groups (CCGs) have duties to reduce health inequalities conferred by the National Health Service Act 2006 (as amended by the Health and Social Care Act 2012). Reducing health inequalities was made a priority by NHS England in the NHS Long Term Plan. | Local Joint Strategic Needs Assessments  |
| 14 | Asthma UK and British Lung Foundation | Identify patients whose ill health is triggered by indoor air pollution and aid in the use of monitoring equipment to identify possible causes in the patient’s home. 1. GPs should be required to ask about indoor air quality in the home when carrying out an annual asthma review and provide the necessary help for a patient to apply for monitoring equipment to allow a patient to better understand what may be triggering their asthma in their home.
2. Commissioners should pay towards monitoring equipment acquired by local authorities to ensure local population living in adequately safe homes.

Patients should be able to understand that air quality in the home could be triggering exacerbations in health issues such as asthma. Patients should know they can have access to assessing the quality of the air in their home through their local authority/GP so that they may identify what they need to change in their home in order to better manage their condition | It’s important that healthcare professionals are identifying those in need of help with improving the indoor air quality of their home in order to improve patient health. | In 2016, the Royal College of Physicians (RCP) and the Royal College of Paediatrics and Child Health (RCPH) published Every Breath We Take: The Lifelong Impact of Air Pollution which reported that air pollution in the UK has a burden on mortality equivalent to 40,000 deaths per year. Further analysis placed the number between 36,000 and 65,000. The report described the adverse effects of air pollution on the development of the fetus, including lung and kidney development and risk of miscarriage; the link between air pollution and asthma, diabetes, dementia, obesity, and cancer; and the increased risks of heart attacks and strokes in later life. | GP patient records The Asthma UK Annual Asthma Survey  |
| 15 | CETEC | Inclusion of sensors within dwellings | Installation of accurate monitors for IAQ to become standard. Need to decide what are the key pollutants that can be used to gauge pollution levels in homes and ensure sensors deployed provide good information. Maintenance of sensors is also a key consideration. | It is generally recognised that low cost sensors for air quality can provide some information but this may not be good enough to help people understand their actual exposure in buildings. More work is needed to ensure the availability of good quality sensors.<https://uk-air.defra.gov.uk/library/aqeg/pollution-sensors/how-could-I-use.php> |  |
| 16 | CO-Gas Safety, the Carbon Monoxide & Gas Safety Society | The gas emergency services carrying & using equipment to test gas appliances and the air inside properties for carbon monoxide. Yet people in the UK spent 90% of their time indoors. Indoor air becomes outdoor air and vice versa. However, indoor air is more concentrated and controllable by the individual and by regulation. | Research by UCL and by John Moore’s Liverpool university has shown that around 5 million people are being affected by levels well above WHO guidelines. | .  | Impact - Numbers affected – could be 3-5 million people affected.See <http://www.co-gassafety.co.uk/about-co/numbers-affected-by-co/> Research commissioned from University College London, published in a press release dated 02.10.06 by HSE, to inform its gas safety review highlights the dangers of CO poisoning in people’s homes, coupled with a lack of public awareness of the risks.The early findings of the research include:\* 23% of homes had one or more defective gas appliance;\* 8% of homes were judged to be at risk of dangerous levels of CO;SummaryBen Croxford’s report found that 50 out of 270 homes (18%) had levels of CO which exceeded the WHO 8-hour average guidelines of 9 ppm. Of this 50, 26 (9.4%) exceeded the WHO 1-hour level (26ppm) and 10 (3.6%) exceeded the WHO 30-minute guideline value of 52ppm.Nearly one in five had levels of CO which exceeded the WHO 8-hour average guideline value (9ppm), nearly one in ten had levels of CO which exceeded the WHO 1-hour average guideline value (26ppm) and nearly one in twenty-seven had levels of CO which exceeded the WHO 30-minute guideline value of 52ppm.Note <https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/families/bulletins/familiesandhouseholds/2017> In the UK there were 27.2 million households in 2017, resulting in an average household size of 2.4.27 million times 2.4 = 64,800,000. 8% of 64,800,000= 5,184,000 so 5 million people. 45% of homes had received no information on the dangers of CO; andA higher prevalence of problem appliances was found in the homes of vulnerable people(young, old, those in receipt of benefits).Furthermore, it is thought that the number affected by CO poisoning is considerably higher - a study conducted by Liverpool John Moores University in 2011 measured CO levels in 109 homes over a number of weeks: it found that 24 homes (22%\*) had CO levels greater than 50 ppm (parts per million) – a level in which symptoms of poisoning, such as headaches, tiredness, and drowsiness can be experienced. A further 53 (48.6%\*\*) homes contained CO levels between 10 and 50 ppm see link to ‘Investigation of audible carbon monoxide alarm ownership’<https://www.emeraldinsight.com/doi/full/10.1108/SASBE-07-2013-0041> <https://www.ljmu.ac.uk/about-us/news/life-saving-research-into-carbon-monoxide> The Gas Safety Trust (GST) also awarded a grant to LJMU to expand the study from two city centres to five counties by partnering with five Fire and Rescue Services, Merseyside, Cornwall, Bedfordshire, West Midlands and Oxfordshire. The funding is also supported by an in-kind contribution from the Council for Gas Detection and Environmental Monitoring (CoGDEM) whose members have supplied CO alarms and data loggers to undertake a comprehensive CO investigation covering 75,000 households.We have tried to obtain the original research done in 2011 but failed. We only have what we have because either it was in a press release or it was copied in to the article by Emerald Insight above. We have also tried to find out what the ongoing research has found with no success so far (31.01.20).  |
| 17 | Council for Gas Detection and environmental monitoring | Monitoring aerosols and gases in kitchens, leading to recommendations about gas and electric hobs covered by this quality standard. | Kitchens are the highest polluting area in the domestic built environment. | There is little knowledge by citizens of the potential dangers from primary and secondary VOCs generated during cooking | INDAIRPOLLNET (a COST group led by Nicola Carslaw at Univ York) is compiling lists of relevant literature. This COST group is over 160 people throughout Europe, working on VOCs in the built environment. |
| 18 | Flexi-Orb | A system for residents to easily check air quality | Reduction in health problems | It will help the residents and also improve health quality | A system for residents to easily check air quality |
| 19 | Policy Connect  | Recommending use of low-level (digital display) carbon monoxide monitors in homes | There is increasing emerging evidence that low-level carbon monoxide exposure is harmful to health; particularly to high metabolic rate organs such as the brain (Bendell, et al. 2019), and to unborn children.NICE’s updated ‘Indoor air quality at home’ guidance already recommends practitioners use World Health Organisation (2010) guidelines on selected pollutants. These include exposure limits for carbon monoxide at low levels (lowest being 24 hours at 7 mg/m3 (6.11 ppm)). However, research shows that some carbon monoxide monitors “do not alert the user to chronic lower levels that may be harmful in the long term” (Shrubsole, et al. 2017, p. 15). Specifically, these are monitors that lack a digital display and no alarm is triggered at levels below 30-50 ppm. Such monitors would therefore fail to warn occupants of exposure that is harmful in the long run. Despite this research, the updated guidance does not at present recommend using low-level (digital display) carbon monoxide monitors that can detect exposure incidences that breach the limits already recommended by NICE. | Given this guidance is concerned with low-level exposure (but not high-level acute), NICE should recommend usage of low-level (digital display) carbon monoxide monitors in homes. Otherwise the guidance will not be effective in practice.Including such a recommendation would improve care by preventing chronic low-level exposure to carbon monoxide. It would also aid diagnosis of chronic low-level exposure by providing patients and practitioners with a precise CO ppm reading.In addition, practitioners who are inspecting homes should be recommended to consider the absence of low-level (digital display) monitors in homes as a risk factor. This risk factor should be assessed as particularly concerning in households with pregnant people and young children, both of which are particularly susceptible to chronic low-level carbon monoxide exposure. | Bendell, C., Moosavi, S.H. and Herigstad, M. (2019). Low-level carbon monoxide exposure affects BOLD fMRI response. Journal of Cerebral Blood Flow & Metabolism. Croxford, B., Leonardi, G. and Kreis, I. (2008). Self-reported neurological symptoms in relation to CO emissions due to problem gas appliance installations in London: A cross-sectional survey. Environmental Health, 7(34). Shrubsole, C., Symonds, P. and Taylor, Jonathon. (2017). Determinants of CO Exposure in the English Housing Stock: Modelling Current and Possible Future Risks. London: University College London. Available here: [Link](https://www.researchgate.net/publication/320923170_Determinants_of_CO_Exposure_in_the_English_Housing_Stock_Modelling_Current_and_Possible_Future_Risks_A_Report_for_Gas_Safety_Trust) [Accessed 20 January 2020].Policy Connect. (2017). Carbon monoxide poisoning: Saving lives, advancing treatment. Available here: [Link](https://www.policyconnect.org.uk/appcog/sites/site_appcog/files/report/633/fieldreportdownload/comedreportfinalweb.pdf) [Accessed 20 January 2020].World Health Organisation. (2010). WHO guidelines for indoor air quality: selected pollutants. Geneva: World Health Organisation. Available here: [Link](http://www.euro.who.int/__data/assets/pdf_file/0009/128169/e94535.pdf?ua=1) [Accessed 20 January 2020]., p. 87.Data from the screening for carbon monoxide in the Emergency Department (EDCO) study will be available later this year. This is crucial data and we anticipate it will produce a more accurate analysis of carbon monoxide poisoning incidence rates, especially low-level cases. You can learn more about this project [here](https://www.stgeorges.nhs.uk/edcostudy/). |
| 20 | PPM Technology Ltd | Requirements for monitoring are not discussed or specified to adhere to the requirements. | Monitoring is an important factor in controlling indoor air quality parameters and maintaining a healthy indoor environment. | Monitoring is an important factor in controlling indoor air quality parameters and maintaining a healthy indoor environment. |  |
| 21 | PPM Technology Ltd | CO2 monitoring | CO2 levels are an excellent indicator of a building’s ventilation. Poor ventilation goes hand in hand with indoor pollutants. Whilst it is still difficult to measure individual VOC’s it is easy and cheap to measure CO2. | Low CO2 levels tend to run hand in hand with low indoor pollutant levels. Indeed, CO2 levels have even been used to ensure adequate ventilation in the Covid-19 pandemic. CO2 is an important factor which must be considered when discussing IAQ. |  |
| 22 | SCM5  | Improved information on pollutant levels in homes | At present there is very little monitoring of IAQ in homes and Building Performance Evaluation is not undertaken as a matter of course. Without large scale data it is difficult to map population level quantum or effects of IAQ | There is very little information available on types and levels of pollutants in homes. Without this it is difficult to identify causal links to ill health, and thus influence construction standards. Recommendations to raise awareness and identify pollutants rely on forms of monitoring and sensing which are becoming more widespread. Guidance is needed on the types and methodologies of indoor sensing. | <https://escholarship.org/content/qt06z249rm/qt06z249rm.pdf> |

**Awareness and advice**

| **ID** | **Stakeholder** | **Key area for quality improvement** | **Why is this important?** | **Why is this a key area for quality improvement?** | **Supporting information** |
| --- | --- | --- | --- | --- | --- |
| 23 | Action on Smoking and Health (ASH) | Support tobacco smokers to quit and to keep homes free from tobacco smoke. | We endorse the response from Fresh and have worked with them to inform our response.NICE NG149 guideline on indoor air quality at home states in its rationale that: “Smoking and environmental tobacco smoke are always a health risk. The committee agreed it was important to encourage people not to smoke in their homes”As reflected by this statement, the harms of second-hand smoke (SHS) are well established. SHS is a significant source of many established harmful pollutants of indoor air, including particulate matter, polycyclic aromatic hydrocarbons (PAHs) and volatile organic compounds.[[7]](#footnote-7) In households with a smoker, cigarette smoke is likely to be the largest source of these pollutants – for instance, more than 87% of PAHs in a smoker’s home can be attributed to SHS.[[8]](#footnote-8) Therefore, where household smoking is present, taking steps to reduce or eliminate it make the greatest contribution to the improvement of indoor air quality.As ASH’s 2018 report, Smoking in the home: New solutions for a smokefree generation,[[9]](#footnote-9) identified, exposure to SHS in the home remains significant. A recent survey of over 10,000 adults conducted by YouGov for ASH found that 13% of all adults in England are exposed to SHS in their home most days.[[10]](#footnote-10) There are also stark inequalities in SHS exposure in the home. When broken down by social grade, 17% of C2DE adults reported being exposed to SHS in their home most days, compared to 10% of ABC1 adults.3 More starkly, when comparing rates between types of housing tenure, 25% of those in social renting arrangements reporting being exposed to SHS most days, compared to 15% who rent privately and 9% who own their property outright.3 These inequalities are mirrored when assessing child exposure to SHS in the home. Whilst 8% of under 18s in owner occupied housing are exposed to SHS most days, this increases to 13% in privately rented housing, and up to 21% in social housing.3 Data from NHS Digital’s Smoking, Drinking and Drug Use among Young People survey also demonstrates child exposure to SHS in the home remains an issue,[[11]](#footnote-11) with 55% of pupils reporting exposure in the last year in their own home or in someone else’s home. Breaking this down, 13% of pupils reported being exposed every day, or most days, 10% reported being exposed once or twice a week, 11% reported being exposed once or twice a month and 21% reported being exposed less than once or twice a month.5The above illustrates that SHS exposure in the home remains a significant problem, thereby making the case for including support for tobacco smokers to quit and maintain smokefree homes in the quality standard.  | ASH and Cancer Research UK publish annual reports on the state of local tobacco control in England. These reports present findings from an online survey of local authority tobacco control leads. The latest report presents findings from 127 of the 151 local authorities with responsibility for public health.[[12]](#footnote-12) The findings evidence a stark inequality in work to address smoking in the home, with less than half (44%) of local authorities engaged in work on smokefree homes.6Although practice to address smoking in the home is inconsistent, other findings from the report present opportunities to tackle this: the biggest opportunity identified by local authority tobacco control leads was establishing partnerships and building wider relationships with the NHS via STPs, as well as embedding tobacco control in wider local authority functions.6 A wide range of professionals could be engaged in work to address tobacco smoke in the home. These professionals should be trained in Very Brief Advice, a NICE endorsed intervention delivered opportunistically to encourage smoking cessation.[[13]](#footnote-13),[[14]](#footnote-14) This could include health practitioners, midwives, health visitors, social workers and care workers and also wider local authority departments such as housing and environmental health.More extensive interventions should also be considered. An intervention designed to reduce SHS exposure to children whose primary caregiver felt unable or unwilling to quit smoking demonstrates the success such initiatives can have on improving indoor air quality. Following the intervention, which involved personalised feedback on home air quality, behavioural support and nicotine replacement therapy for temporary abstinence, levels of PM2.5 decreased significantly more (by 35.2%) in households which received the intervention compared with households where no intervention took place, as did the proportion of time PM2.5 exceeded WHO recommended levels of maximum exposure.[[15]](#footnote-15) Even where individuals are unable to quit, therefore, there are still significant benefits to child health through the reduction of SHS in the home. Whilst ASH is aware of local authorities actively promoting smokefree homes by delivering smoking cessation interventions through housing channels and others in contact directly with people in the home, this practice is not routine, even amongst healthcare professionals.3 Implementation of such initiatives would not have any significant cost implications, particularly when compared with measures required to facilitate better ventilation (which does not completely remove particulates). Costs are largely confined to training (VBA training is freely available)7 and the joining up of services, for example by training staff to refer residents to local stop smoking support which can provide behavioural support and advice on pharmacotherapy.8 Focussing on reducing tobacco smoke in the home as an area for quality improvement could also help address the issue of domiciliary worker exposure to SHS. Employer policies designed to protect domiciliary workers from SHS exposure are not common place - ASH’s Smoking in the home report found that just a quarter of housing provider’s surveyed (18 providers surveyed, representing over 200,000 homes) had a policy that included provision for protecting staff from SHS exposure when working in someone’s home.3 Some organisations have successfully implemented policies protecting domiciliary workers as part of wider smokefree policies, such as Newcastle Upon Tyne Hospitals NHS Foundation Trust where patients are informed of the Trust’s smokefree policy and advised not to smoke for an hour in the home prior to a visit from healthcare professionals. Feedback from the community team suggests that the policy is successful, and there is a clear process for non-compliance with the policy.3 Therefore, despite such policies not being common place, as policies already exist they could be easily rolled out across other employer’s of domiciliary workers.As mentioned previously, addressing household smoking, where it is present, can be the single greatest contributor to improving indoor air quality. Whilst local practice on addressing smoking in the home is extremely variable, there are opportunities to address this. Further, smoking cessation and smokefree homes interventions are effective and could be delivered with minimal cost implications.  | Support tobacco smokers to quit and to keep homes free from tobacco smoke. |
| 24 | Allergy UK | Improve education and awareness amongst healthcare commissioners and clinicians about the impact of poor housing, ventilation, indoor allergens on health and quality of life  | The impact of poor quality housing is recognised as having an effect on respiratory health but the effect on worsening or development of allergic conditions is not always recognised as being of importance | There are numerous studies showing that Health care professionals feel they do not have the skills or knowledge to adequately treat and manage allergic conditions or recognise trigger allergens – conditions such as allergic rhinitis are not taken seriously – however allergic rhinitis in children can lead to the development of asthma or worsening of asthma and development of type 2 inflammatory process in any age And therefore trigger allergens should be considered as important as medical phrmacotherpay in the treatment of allergic conditions  | The impact on quality of life with allergy and respiratory disease is a very important part of the decision-making process in policy development<https://www.rcpch.ac.uk/sites/default/files/2020-01/the-inside-story-report_january-2020.pdf> |
| 25 | Allergy UK | Increased awareness for policy makers and commissioners of services including housing and environmental services on the impact of indoor air quality and the associated risk of the development of allergic, respiratory, and other diseases especially during pregnancy and early childhood | The long term socioeconomic implications of these conditions and the impact on health, ability to work and quality of lifeThe impact on quality of life with allergy and respiratory disease should be considered a very important part of the decision-making process in policy development |  | The revised WHO guidelines due to be published in June 2021 has recognised that allergic conditions are an important health concern when devising policies for indoor air quality. The BSACI (British society for allergy and clinical immunology) has developed guidance on indoor air quality – the inside story - and states ‘The United Nations Convention on the Rights of the Child sets out clear guidance to protecting the rights of children and young people, including a child’s right to the best possible health (Article 24) and the right to a good standard of living. Government must support this where the family is unable (Article 27). Unicef also consider that clean air is a right for all children. The Royal Colleges vigorously advocate for a healthy environment at the population level and in local communities, especially where socioeconomic circumstances limit the choice of where people can live, and which school children attend.’ |
| 26 | Alliance for Sustainable Building Products | Education | One of our members measured formaldehyde levels in a school in Manchester 10 times WHO recommended levels. Whilst this consultation is on domestic, the same principal applies that the industry knows very little about obtaining and maintaining good iaq | There are a number of organisations that aim to assist with education, but budgets are always tight. The Centre for Moisture in Buildings and the UK Indoor Environment Group (UKIEG) are also good. Their conference is 24th June | Our organisation has written lots of briefing papers on iaq and formaldehyde and PHE have spoken at our events. The Well Building Standard mandates iaq testing on commercial properties and might be extended to domestic. |
| 27 | Asthma UK and British Lung Foundation | Improved GP knowledge on impact of indoor air pollution on people with asthma monitored through annual survey of GPs and indoor air quality provided in standard training on asthma and other health conditions affected by indoor air quality GPs receive training on the impact of indoor air quality in any general respiratory training/training on any health conditions impacted by poor indoor air qualityAssessment of GP knowledge on the impact of indoor air quality on health through annual survey of GPsCommissioners ensure indoor air quality is covered in GP training/annual update trainingPatients can trust that their GP understands the implications of poor indoor air quality and can expect to receive the appropriate advice and provisions if suffering from a health condition exacerbated by poor indoor air quality in their home | In order for patients to receive helpful advice, GPs must initially be armed with knowledge on the health implications of indoor air quality. GPs are the best placed healthcare professionals to understand a patient’s circumstances and living situation and are therefore most suitable for delivering this information and aiding patients in seeking help. | The RCPCH state in The inside story: Health effects of indoor air quality on children and young people that it should be ensured that GPs and other clinicians can talk and give advice about indoor air quality to patients | Annual GP survey |
| 28 | BEAMA | Education | Many residents are not aware of the impact of their daily lives on their indoor air quality. An education programme that highlights these points and helps residents make the right choices will help improve indoor air quality in the home. | UK surveying of consumers shows the lack of awareness regarding indoor air quality and their own behaviours. | Clean Air Day 2019 Opinium research conducted with 2000 UK adults.Example findings include:When asked about the sources of indoor air pollution: • Only 2% of respondents selected chipboard furniture, and only 1% selected sofas as one of the biggest contributors to indoor air pollution (see table below). • Only 9% of respondents thought that personal care products were one of the biggest contributors to indoor air pollution. • Only 15% of the population thought that paints and varnishes were one of the biggest contributors to indoor air pollution, such as VOCs.Full research tables available via: <https://www.globalactionplan.org.uk/clean-air-public-insight-tracker> |
| 29 | CO-Gas Safety, the Carbon Monoxide & Gas Safety Society | Raising awareness of the dangers of carbon monoxide and other toxic products of combustion caused by burning any carbon based fuel such as oil, coal, gas, wood etc. Also, awareness of the other toxins in the products of combustion see <http://www.co-gassafety.co.uk/about-co/other-toxins/> | The HSE recommended a levy to fund raising awareness of the dangers of CO and for research in 2000 after a fundamental review into gas safety.Funding to raise awareness of the dangers should be done by a massive PR campaign using prime time TV as has recently been done to raise awareness of the need to obtain a ‘flu jab and also using social media etc. Please note that the known deaths and injuries from CO cost the UK taxpayer £178 million a year <https://www.publications.parliament.uk/pa/cm201314/cmselect/cmcomloc/50/50iii132.htm>and we are sure there are many unknown deaths and injuries. For example, there is no automatic test for CO on death. With lower level poisoning even a blood or breath test on a survivor will usually come back negative because in a survivor, CO leaves the blood and breath quite quickly. There is therefore a huge danger of a false negative leading to wrong diagnosis and wasted treatment.  | The evidence we have is what victims of carbon monoxide have told us over 25 years. Also the respected university research by UCL and John Moore’s university see further below. Many victims we have spoken to did not even know carbon monoxide (CO) existed let alone how to prevent it. If they did know about CO, many did not realise it could come from fuels other than gas or petrol or did not know it could come from burning wood. Most people don’t know anything about the other toxins in the products of combustion.Recommendations by HSC/E made in 2000 Simple solutions to reducing unintentional deaths and injuries from carbon monoxide poisoning from faulty cooking and heating appliances powered by all or any carbon based fuels.Less than 2% of CO in the air can kill in between one and three minutes see <http://www.hse.gov.uk/foi/internalops/hid_circs/technical_osd/spc_tech_osd_30/spctecosd30.pdf> see Para 74 table 23 page 26We found the most vital ideas within a few weeks of talking to victims after we started in 1995 and after much lobbying by us the Health and Safety Commission/Executive made two excellent recommendations in 2000. These were:-Levy on the gas suppliers to pay for raising awareness of the dangers and for research(we would prefer the levy on the whole fuel industry) andThat the gas emergency service carry and use equipment to test gas appliances for emissions of carbon monoxide (CO). Please note that these recommendations were made after an exhaustive gas safety review and with the support of the majority of the stakeholders, who were mainly industry. Lord Hunt of Kings Heath has described the gas emergency service having & using equipment to test gas appliances for CO as a ‘no brainer’. Sadly, neither recommendation has been implemented. We had a meeting with HSE in April 2019 and we raised these recommendations because they are still needed. We received an entirely negative response. This needs political will. CO victims need to know about CO and how to prevent it killing or injuring themselves and their loved ones see <http://www.co-gassafety.co.uk/about-co/prevention/> But the gas emergency service does not carry or use equipment to test gas appliances for CO. The First Call Operators do have Personal Alarm Monitors for CO to protect them but consumers calling 0800 111999 are told to turn off appliances/gas and open windows so by the time the FCO arrives any CO will usually have dissipated.A massive PR campaign including prime time TV warnings could raise awareness of the dangers of CO very easily. For example, the Government adverts advising people to obtain ‘flu jabs.What people need is to know is are they safe from CO of have they been poisoned by CO? If they have been poisoned by CO, they need to know by how many parts per million in writing so they can take this to their GP and receive correct treatment. At the moment, the gas emergency service simply cuts off the gas and may check next door using visual signs only, yet CO cannot be sensed using human senses…The problem is that a vulnerable victim is left to deal with the appliance. The consumer may be able to get the appliance serviced or repaired but they almost certainly won’t be able to find anyone qualified to test the appliance and provide evidence of poisoning by CO and if so, parts per million of CO in writing that they were exposed to. This means that often the victim won’t even know they’ve been poisoned by CO and the medical treatment will be incorrect. This wastes vital NHS resources.Also, the victim will lack crucial evidence so won’t be able to sue for damages against, say a landlord. This means that the burden of injury or death falls on the taxpayer not on the wrongdoer. This perpetuates the problem. © Copyright CO-Gas Safety 2019 |  |
| 30 | CO-Gas Safety, the Carbon Monoxide & Gas Safety Society | Improved training for Registered Gas Engineers about CO from other fuels. | Because three deaths are due to the lack of this education that we know about. Please see <http://www.co-gassafety.co.uk/information/gas-installers/>  |  | We have tried to convince the bodies that decide on what should be in the ACS course to include more on CO. Three deaths have been caused to our knowledge by registered gas engineers due to their lack of awareness of the dangers of CO from fuels other than gas see <http://www.co-gassafety.co.uk/information/gas-installers/> Who knows how many deaths have actually occurred. All those in charge of the ACS course have done is allow colleges to use case studies that show the need for this but this is very weak and cannot be construed as anything other than a polite refusal to include material about CO from all fuels. We refer you to <http://www.co-gassafety.co.uk/information/gas-installers/>  |
| 31 | Council for Gas Detection and environmental monitoring  | Communicate with public through social media and Beko, other manufacturers |  |  |  |
| 32 | Federation of Environmental Trade Associations Ltd | Education | There are many things a resident can do to avoid poor IAQ in their home; Installing adequate ventilation and heating, reducing the use of VOCs in the home, managing how much moisture is created/released into the air. However, many residents are not aware of the impact of their daily lives on their IAQ | An education programme that highlights these points and helps residents make the right choices will help improve IAQ in the home |  |
| 33 | Flexi-Orb | Movement away from gas fires | Reduce carbon levels and pollution | It will help the climate and also the residents | Movement away from gas fires |
| 34 | Fresh  | Encourage tobacco smokers to quit and to keep homes free from tobacco smoke. | We endorse the response from Action on Smoking and Health (UK) and have drawn on their submission to inform ours.In line with the NICE NG149 guideline on indoor air quality at home which states that: “Smoking and environmental tobacco smoke are always a health risk. The committee agreed it was important to encourage people not to smoke in their homes,” we recommend that the primary area for quality improvement is to encourage tobacco smokers to quit and to keep homes free from tobacco smoke.The harms of secondhand smoke (SHS) are well established. SHS is a significant source of many established harmful pollutants of indoor air. In households with a smoker, cigarette smoke is likely to be the largest source of these pollutants, therefore, where household smoking takes place, measures to reduce or eliminate it will make a significant contribution to the improvement of indoor air quality.ASH’s 2018 report, Smoking in the home: New solutions for a smokefree generation,[[16]](#footnote-16) reports that exposure to SHS in the home remains significant. A recent survey for ASH found that 13% of all adults in England are exposed to SHS in their home most days.[[17]](#footnote-17) There are also inequalities in SHS exposure in the home:More C2DE adults reported being exposed to SHS in their home than ABC1 adults (17% v 10%).3 More people in social rented housing reported being exposed to SHS most days than those who rent privately and those who own their property (25% v 15% v 9%).3 More children (under 18s) in social rented housing reported being exposed to SHS most days than those living in privately rented homes and those who live in owner-occupied homes (21% v 13% v 8%).3 The impact of exposure to SHS as an issue of health inequality should be a driver for action around supporting more tobacco smokers to quit and encouraging homes to be smokefree. | The health impacts of exposure to SHS is significant. Children breathing in other people’s tobacco smoke can suffer from cot death, asthma, chest infections, meningitis and other serious illnesses. For adults, the risk of respiratory and heart disease as well as cancer increases with exposure.However, knowledge of the harms of SHS by the public, particularly to children, is not always widely understood. Around 30% of adults in the North East were unaware of the impact that SHS can have of the risk of cot death[[18]](#footnote-18). Knowledge of harm to adults, too, is not always widespread. For example, around 15% of those surveyed in the North East were unaware that SHS can have an impact on the risk of heart attack. By including support for smokefree homes in the quality standard, this reinforces the understanding of the harms of SHS.There are opportunities for professionals from a wide range of disciplines to become engaged – or to develop their engagement – with the tobacco control agenda. For example, all professionals such as housing officers, environmental health practitioners, midwives, social workers and care workers could be trained in Very Brief Advice, a NICE endorsed intervention delivered opportunistically to encourage smoking cessation.[[19]](#footnote-19),5 There are also practical ways in which tobacco smokers can be supported to keep their homes smokefree if they are unwilling to quit, e.g. through the use of vaping products or other non-tobacco, nicotine containing products.Fresh have delivered several programmes of work highlighting the importance of keeping homes smokefree, including most recently the ‘Secondhand smoke is poison’ campaign based on the original campaign in Scotland: <http://www.smokefreefamilies.co.uk/>  | Please see this report from ASH which outlines the issues around tobacco smoking in the home and how this can be addressed:<https://ash.org.uk/information-and-resources/reports-submissions/reports/smoking-in-the-home-new-solutions-for-a-smokefree-generation/>  |
| 35 | Royal College of Paediatrics and Child Health | Public Health Awareness is vital, and the guidelines should be targeted to all public health professionals involved in health risks of environmental exposure. | Setting a threshold for indoor air pollutants, combined with safety factors is needed. |  |  |
| 36 | Royal College of Paediatrics and Child Health | [Suggested as additional developmental areas of emergent practice]Education of adults and children regarding indoor and outdoor air quality is important. Possible pollutants are cigarette smoke, fumes from fireplaces, wax candles, aerosols, deodorants, air fresheners, PVC flooring and paint; they all contribute to poor indoor air quality. Regular airing of indoor space is important, but outdoor air quality also needs to be considered (fumes from cars, factories, landfill sites etc). Trees and plants improve air quality by absorbing carbon dioxide and producing oxygen. |  |  |  |
| 37 | SCM2 | Householder awareness of indoor air quality at home (IAQAH) health impacts | There is low householder awareness of IAQAH and its negative health impacts. Without greater awareness, householders are unlikely to consider or think about how IAQAH may be impacting their own or others’ health, and therefore unlikely to take any relevant action or change of behaviour.Greater householder awareness is essential for behaviour changes (e.g. removal or reduction of IAQAH sources and use of ventilation) and to put pressure on home providers (e.g. landlords and developers) to reduce and mitigate other IAQAH sources, especially where improved IAQAH entails greater costs.Other solutions to addressing poor IAQAH, such as greater awareness among and greater regulation of home providers would be insufficient alone to address the negative health impacts of IAQAH (without also greater householder awareness).  | Raising awareness of the negative health impacts of poor IAQAH is critical to support all other ways to address IAQAH.  | NICE Indoor air quality at home Guideline, January 2020;NICE Indoor air quality at home: [2] Evidence review for exposure to pollutants and health outcomes, June 2019;NICE Indoor air quality at home: [4] Evidence review on effective strategies for raising awareness, June 2019;NICE Indoor air quality at home: [A] Evidence reviews for indoor air quality at home: Cost effectiveness outcomes, March 2019;RCPCH The inside story: Health effects of indoor air quality on children and young people, January 2020;Dept for Environment, Food and Rural Affairs, Clean Air Strategy 2019;Royal College of Physicians. Every breath we take: the lifelong impact of airpollution. Report of a working party. London: RCP, 2016; |
| 38 | SCM2 | Householder awareness of IAQAH drivers | Along with low householder awareness of IAQAH, awareness of the causes of poor IAQAH is likely to be even lower than knowledge of the health impacts. Hence, much greater awareness of the health impacts and causes of poor IAQAH are needed in combination, in order to lead to necessary householder behaviour changes (i.e. reducing or mitigating IAQAH sources) and to put pressure on home providers to reduce or mitigate poor IAQAH sources.  | Raising awareness of the drivers of poor IAQAH is also essential to support all other measures to address IAQAH.  | NICE Indoor air quality at home Guideline, January 2020;NICE Indoor air quality at home: [3.1] Evidence review for material and structural interventions, June 2019;NICE Indoor air quality at home: [3.2] Evidence review for occupant behaviour Interventions, June 2019;NICE Indoor air quality at home: [4] Evidence review on effective strategies for raising awareness, June 2019;NICE Indoor air quality at home: [A] Evidence reviews for indoor air quality at home: Cost effectiveness outcomes, March 2019;Dept for Environment, Food and Rural Affairs, Clean Air Strategy 2019 |
| 39 | SCM3  | National and Local Government Advice to the public on the causes of poor indoor air quality, the associated hazards and ways to prevent or mitigate | Members of the public can take relatively simple steps to improve indoor air quality with the right information | Poor indoor air quality affects all sectors of the housing stock including owner-occupation, private rented sector and social housing. It is important that owners, landlords and tenants are all aware of their rights and responsibilities and the actions required to improve indoor air quality. These include personal behaviours as well as accommodation design and maintenance  | RCPH report 2020 The inside story: Health effects of indoor air quality on children and young people  |
| 40 | SCM4/PHE | Develop training of Healthcare professionals to understand the risks of poor indoor air quality and advise properly their patients. | There is good evidence that exposure to indoor air pollution can deteriorate the quality of life and health status of patients with respiratory and cardiovascular diseases.  | There is a great lack of awareness amongst the healthcare professionals about the impact of poor indoor air pollution on health. | RCPCH report (2020) ‘The inside story: Health effects of indoor air quality on children and young people’.<https://www.rcpch.ac.uk/resources/inside-story-health-effects-indoor-air-quality-children-young-people> |
| 41 | SCM4/PHE | Local authoritystaff who visit people in their homes (such as housing, healthcare and social careprofessionals) should raise awareness of poor IAQ in the home. | Good evidence showed that exposure to poor indoor air quality is linked to a range of health problems. Certain groups are more vulnerable, eitherbecause of their personal or housing conditions. Since poor indoor air quality is a hidden health threat, raising awareness is a first step in reducing the risk of long-term health issues, especially for vulnerable groups. | People are not aware of the sources of indoor air pollution in their homes and how their activities may affect IAQ. | NICE guideline NG149RCPCH report (2020) ‘The inside story: Health effects of indoor air quality on children and young people’.<https://www.rcpch.ac.uk/resources/inside-story-health-effects-indoor-air-quality-children-young-people> |
| 42 | UKIEG | Children, young people and adults with chronic respiratory or cardiovascular conditions should be given advice at routine health appointments on how to minimise indoor air pollution through minimising indoor sources of pollution and ensuring appropriate ventilation. | NICE guidance already recognises the importance of exposure to outdoor air pollution for individuals managing these diseases (QS181). The management of indoor air pollution is also vital for these groups. | There is a great lack of awareness amongst the public and many professionals about the impact of indoor air pollution on health. | The RCPCH and RCP 2020 report ‘The inside story: Health effects of indoor air quality on children and young people’ clearly presents the evidence and the need for action.https://www.rcpch.ac.uk/resources/inside-story-health-effects-indoor-air-quality-children-young-people |
| 43 | UKIEG | Preventing, mitigating and repairing dampness and its causes | This is such a prevalent issue especially among vulnerable low-income households it should be a high priority for improvement.  | Links between damp conditions and a range of health conditions are well documented. As stated in the RCPCH/RCP report a high proportion of scientific publications on the topic of IAQ and health concern the impact of dampness and mould. | https://www.rcpch.ac.uk/resources/inside-story-health-effects-indoor-air-quality-children-young-people |

**Building materials and design**

| **ID** | **Stakeholder** | **Key area for quality improvement** | **Why is this important?** | **Why is this a key area for quality improvement?** | **Supporting information** |
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| 44 | Allergy UK | Provide an incentivised scheme for improving ventilation, heating and use of allergen and respiratory friendly building materials for building contractors and estate agents when selling properties that comply with regulations  | Incentivised schemes such as those in Denmark and Sweden that have targeted house builders directly to build houses that comply with regulations for air quality including schemes that have a health criteria when building or renovating and incentivised benefit for estate agents - where houses/ buildings that comply with regulations for air quality have an increased value Use of smart gadgets built into homes to measure indoor air quality | In the UK many housing areas in poorer social areas are substandard and have problems with poor ventilation, moulds, build-up of allergens etc and have a higher incidence of respiratory illness including asthma amongst children. Sick building syndrome (SDS) is recognised in the UK and relates to the above factors | The revised WHO guidelines due to be published in June 2021 has recognised that allergic conditions are an important health concern when devising policies for indoor air quality. EFA guidelines on air quality European guidelines on air quality – indoor <https://ec.europa.eu/health/scientific_committees/opinions_layman/en/indoor-air-pollution/index.htm><https://ec.europa.eu/environment/integration/research/newsalert/pdf/383na1_en.pdf> |
| 45 | Alliance for Sustainable Building Products | Source control | The best way of ensuring good iaq is not to bring chemicals/substances into the home. However, it is hard for the consumer to navigate through the product information | In France, the ANSES label covers the emissions of substances, classified into four categories from A+ to C. The lowest mark of the various substances emitted by a given material is noted on the label. Since the 1st September 2013, every building material (including insulation)[[20]](#footnote-20) has the obligation to hold this label.  | Other eco-labels exist such as natureplus, where criteria are set by their commission and products analysed in the lab and 3rd party accredited. An award of the label means the product is healthy |
| 59 | Flexi-Orb | Breathable insulation | Reduction in consumer complaints | It will prevent mould and damp in residential buildings | Breathable insulation |
| 61 | Northern Ireland Housing Executive | Insulation measures | Turn internal energy gains from occupants and solar gains through windows into air & surface temperature rises | Prevents surface mould formation on occupation, promotes air movement, air changes by buoyancy/ warm air rising | Physical laws |
| 69 | SCM2 | Consumer product labelling on negative IAQAH impacts | There is currently no (or only limited) labelling on consumer products that might adversely impact IAQAH, such as cleaning and personal products, aerosols, candles, incense, cosmetics, paints and solvents, certain cooking methods, domestic fuels, and furnishings.More prominent product labelling and warnings could make a big difference to raising householder awareness and changing behaviours. | Consumer product labelling would make a substantial targeted impact at raising awareness of products that cause poor IAQAH and likely changes in householder behaviours in their choice and use of such products.  | NICE Indoor air quality at home Guideline, January 2020;NICE Indoor air quality at home: [3.2] Evidence review for occupant behaviour Interventions, June 2019;NICE Indoor air quality at home: [4] Evidence review on effective strategies for raising awareness, June 2019;NICE Indoor air quality at home: [A] Evidence reviews for indoor air quality at home: Cost effectiveness outcomes, March 2019;BRE Trust, Ensuring good indoor air quality in buildings, March 2019;Dept for Environment, Food and Rural Affairs, Clean Air Strategy 2019 |
| 71 | SCM4/PHE | Develop national strategy to improve indoor airQuality, by introducing labelling schemes, to reduce exposure to chemicals | Regulation is important to reduce emissions from construction and consumer products in the indoor environments, to meet the safe limits for pollutants inresidential developments (as proposed by WHO (2010) and PHE (2019) IAQ guidelines). | There is lack of labelling schemes in the UK, which could reduce the emissions of formaldehyde and volatile organic compounds (VOCs) in the indoor environment and their transfer outdoors. | Defra, 2019. The Clean Air Strategy 2019 © Crown copyright.<https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/770715/clean-air-strategy-2019.pdf>Shrubsole C, Dimitroulopoulou S, Foxall AK, Gadeberg B, Doutsi A (2019). IAQ guidelines for selected volatile organic compounds (VOCs) in the UK. Building and Environment, Vol 165, <https://doi.org/10.1016/j.buildenv.2019.106382> |
| 72 | SCM5  | Improved labelling of building products | Source control – the prevention of pollutants occurring in buildings – is an important strategy for reducing pollutant loads. However, this is difficult to control at present due to lack of information about pollutant content of building materials. | Building designers and contractors have little access to information that describes the chemical content and potential emissions from building materials. Without this information it is difficult to prevent materials which contain harmful pollutants from entering. Loss of authority of EU standards (eg REACH) and use of other standards (eg EPA) may adversely affect this. | <https://www.rcpch.ac.uk/resources/inside-story-health-effects-indoor-air-quality-children-young-people><https://www.gov.uk/government/publications/air-quality-uk-guidelines-for-volatile-organic-compounds-in-indoor-spaces> |
| 46 | Alliance for Sustainable Building Products | Ventilation | We know from past studies that MVHR systems have a significant failure rate. This is often down to lack of design knowledge, poor installation and lack of commissioning. Also, residents often turn them off, due to noise and to save money | We need more testing of such systems, otherwise iaq will continue to be poor, with all the associated health effects | Past studies have been carried out by Four Walls and commissioned by DCLG (as was) |
| 47 | BEAMA | Correctly specified and installed ventilation | Ventilation is key to managing condensation in the home and reducing the risk of harmful mould forming. It also has a large role to play in improving the indoor air quality in the home, especially in the case of MVHR where filters can improve the quality of the air coming in to the home. Choosing the correct ventilation system, then ensuring it is correctly installed and commissioned, can have a significant impact on air quality in the home. When it is improperly specified or not properly installed, it can exacerbate indoor air quality issues. | There is significant body of evidence that when ventilation has not been well specified or installed properly, indoor air quality suffers. | Please see the following studies:MHCLG (2019) Ventilation and IAQ in new homes: <https://www.gov.uk/government/publications/ventilation-and-indoor-air-quality-in-new-homes>Zero Carbon Hub. (2016). Ventilation in New Homes.<http://www.zerocarbonhub.org/sites/default/files/resources/reports/ZCH_Ventilation.pdf>Cartwright Pickard (2016) Air Quality in New Homes<https://www.cartwrightpickard.com/research/air-quality-in-new-homes/> |
| 48 | BEAMA | Noise and nuisance running | A ventilation product that is noisy or causes nuisance running is likely to be turned off by the resident and therefore will not play its role in delivering better indoor air quality.  | Ventilation systems that are noisy, either by design or improper installation have been shown to be switched off, which will in turn lead to deteriorating indoor air quality. | Evidence:One issue highlighted in this report is the potential conflict between noise and the use of the ventilation system. In particular, concerns were raised by residents in this study around the noise from extract fans. This resulted in both intermittent and continuous fans not being operated, which could potentially lead to long-term under-ventilation consequences for that home. It is also noted that some residents did report problems with the ingress of external noise e.g. where there is a main road at the front of the home. In this case, there is a tendency to close the trickle ventilators to reduce the ingress of noise. This has the secondary effect of reducing ventilation rates.From: MHCLG (2019) Ventilation and IAQ in new homes: <https://www.gov.uk/government/publications/ventilation-and-indoor-air-quality-in-new-homes>Evidence of guidance that can be followed:Harvie-Clark, Jack, et al. "Assessing noise with provisions for ventilation and overheating in dwellings." Building Services Engineering Research and Technology 40.3 (2019): 263-273. |
| 49 | BEAMA | Servicing and Maintenance | Without regular servicing, ventilation systems could be underperforming and not doing the job intended.A regular servicing/maintenance programme will ensure the ventilation system continues to operate at optimum, and filters are regularly cleaned/replaced to ensure the air coming in to the property is correctly filtered. | Ventilation systems that are not cleaned or maintained properly can have a negative impact on indoor air quality, or reduce the effectiveness of the ventilation strategy employed in the home. | Estill, Cheryl Fairfield, et al. "The impact of maintenance and design for ventilation systems." Applied occupational and environmental hygiene 17.5 (2002): 344-351. |
| 50 | BEAMA | Filtration | Air outside the home can be heavily polluted and without suitable filtration, any product that allows air in to the home without filtration could be contributing to and exacerbating indoor air pollution. | The UK Chief Medical Officer’s annual report 2017 – ‘Health Impacts of Air Pollution’ – references new indoor air ventilation and filtration models, developed by the EU-funded HEALTHVENT, which have shown the potential for significant health risk reduction. | Please see the ‘Health Impacts of Air Pollution’ 2017 report from the UK’s Chief Medical Officer which highlights pollution as a threat to the public’s health. [Click here for the report](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/690846/CMO_Annual_Report_2017_Health_Impacts_of_All_Pollution_what_do_we_know.pdf). |
| 51 | Building Research Establishment | Ventilation rates to be measured to ISO 16000‑8, or by air‑flow hoods for mechanical ventilation | While ventilation rates are specified in building regulations, these are often only calculated theoretically. Ministry of Housing, Communities & Local Government and other studies have shown that many buildings are under ventilated | Carbon dioxide, a bio effluent, is used to assess the adequacy of ventilation. It has been linked to loss of cognition and torpor.Elevated carbon dioxide concentrations due to inadequate ventilation may be expected in buildings with high occupant density, and so will disproportionately affect the more disadvantaged in our society. Any loss of cognition will impair children’s ability to learn and complete homework, which could affect their exam grades, perpetuating their life of poverty.The COVID pandemic has highlighted the benefits of buildings being properly ventilated to help reduce the spread of infection. | Please see: Royal College of Paediatrics and Child Health report “The inside story: Health effects of indoor air quality on children and young people” published January 2020. <https://www.rcpch.ac.uk/resources/inside-story-health-effects-indoor-air-quality-children-young-people> Architects Journal article “Airtightness blamed for health risks in homes” published November 2016. <https://www.architectsjournal.co.uk/buildings/airtightness-blamed-for-health-risks-in-homes> Ministry of Housing, Communities & Local Government study “Ventilation and Indoor Air Quality in New Homes” published September 2019. <https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/835208/Research_-_ventilation_and_indoor_air_quality.pdf> |
| 52 | CETEC | Design of homes to mitigate high outdoor pollution levels | Designing form of house to let it ventilate naturally for most of a year. However, when outdoor pollution levels are accurately determined to be high, incorporating within the design parameters a mechanical ventilation system that can be used to draw in air and ‘treat’ it. | Indoor/outdoor air pollution relationships have not been studied in enough detail. <https://nerc.ukri.org/funding/application/currentopportunities/pre-announcement-networks-to-build-interdisciplinary-communities-to-address-air-quality-challenges-across-the-indoor-outdoor-continuum/>Indoor air pollution is believed to be addressable by openings to the outdoor fresh air, with insufficient understanding that it may only bring in different problems. |  |
| 53 | CETEC | Impact of energy efficiency policies  | Energy efficiency is still a laudable objective, but it is not clear that sufficient attention is being paid to the air quality in ever more airtight buildings.  |  |  |
| 54 | Council for Gas Detection and environmental monitoring | Focus also on local ventilation and maintenance of hob hoods |  |  |  |
| 55 | Federation of Environmental Trade Associations Ltd | Correctly specified and installed ventilation | Ventilation is key to managing condensation in the home and reducing the risk of harmful mould forming. It also has a large role to play in improving the indoor air quality in the home, especially in the case of MVHR where filters can improve the quality of the air coming into the home.  | Choosing the correct ventilation system, then ensuring it is correctly installed and commissioned, can have a significant impact on air quality in the home. |  |
| 56 | Federation of Environmental Trade Associations Ltd | Noise and nuisance running | A ventilation product that is noisy or causes nuisance running will get turned off by the resident and therefore will not play its role in delivering better IAQ. Any product that contributes to good indoor air quality should also be silent or very quiet. |  |  |
| 57 | Federation of Environmental Trade Associations Ltd | Servicing and Maintenance | Without regular servicing, ventilation systems could be underperforming and not doing the job intended. A regular servicing/maintenance programme will ensure the ventilation system continues to operate at optimum, and filters are regularly cleaned/replaced to ensure the air coming in to the property is correctly filtered. |  |  |
| 58 | Federation of Environmental Trade Associations Ltd | Filtration | Air outside the home can be heavily polluted and without suitable filtration, any product that allows air in to the home without filtration could be contributing to the problem.  |  |  |
| 60 | Flexi-Orb | Making MVHR more affordable | Reduce number of cases referred to NHS for breathing problems | It will help ensure adults and children are breathing in good air within home | Making MVHR more affordable |
| 62 | Northern Ireland Housing Executive | Insist that heating controls can prevent temperatures falling too far | Prevents relative humidity rising too far with temperature falls, by small inputs of heat. E.g.@night | Prevents surface mould formation, promotes air movement, air changes | Physical laws of gases; psychrometric charts. |
| 63 | Northern Ireland Housing Executive | Mechanical Ventilation Systems Installed | Promotes air changes, assures a minimum air change rate. | Prevents surface mould formation, promotes air movement, air changes. Dilutes radon. | Adding extract fans to energy efficiency packages seems effective in reducing admissions by 38% in this scheme. [https://www.journalslibrary.nihr.ac.uk/phr/phr06080#/abstract](https://www.journalslibrary.nihr.ac.uk/phr/phr06080%23/abstract)see vi results on the first pages of the full report. We have further information on NI pilot studies by us. |
| 64 | Northern Ireland Housing Executive | Mechanical Ventilation Heat Reclaim Systems Installed | Promotes air changes while saving energy | Prevents surface mould formation, promotes air movement, air changes. Dilutes radon. | Physical laws |
| 65 | Northern Ireland Housing Executive | Introducing solar air pre-heating systems to the UK | Enables ventilation rates to be increased without increasing carbon emissions | Removes indoor pollutants and reduces mould risks by reducing humidity. Dilutes radon. | Book Robert Hastings et al |
| 66 | Royal College of Paediatrics and Child Health | COVID-19 indoor air quality:The layout and design of a building as well as occupancy and type of heating ventilation and air conditioning (HVAC) can impact the potential airborne spread of the virus. | Central filtration should be upgraded to MERV 13 for the highest compatible filter class during COVID 19. Using Particulate matter (PM 2.5) levels to track improvements can provide desired fresh air levels. Preliminary evidence connects long term exposure to PM greater than 2.5 leads to increased mortality in COVID.Maintaining air quality index is important to decrease airborne transmission of COVID. |  |  |
| 67 | SCM1 | Ventilation is a key consideration when building and retrofitting homes.  | There is good evidence of the benefits of improving ventilation in the home.  | Experience from the pandemic reinforces the importance of ventilation on indoor air quality and preventing the spread of infectious diseases.  | ‘Ventilation of Indoor Spaces to Stop the Spread of Coronavirus (COVID 19)’ |
| 68 | SCM1 | Indoor air quality is a key consideration when installing energy efficiency measures in residential dwellings.  | There is evidence that improvements to the energy efficiency of housing can have an impact on ventilation and in turn indoor air quality.  | It is important to improve the energy efficiency of older housing, and retrofitting will increase with our commitment to reduce carbon emissions. If it is not done properly, this retrofitting may have unintended consequences of reducing indoor air quality.  | NICE Guideline Indoor Air Quality: Evidence review for ventilation design and use. The Inside Story: Health effects of indoor air quality on children and young people.  |
| 70 | SCM3  | Schools should ensure adequate safe ventilation and maintenance of class rooms | Children spend considerable time in schools. In heavily trafficked areas inappropriate ventilation can increase exposure. Ineffective maintenance can lead to the build up of harmful moulds and dusts. | Children are especially vulnerable to air pollution and the effects can have life long impacts | RCPH report 2020 The inside story: Health effects of indoor air quality on children and young people RCP Report 2016 Every breath we take: the lifelong impact of air pollution |
| 73 | SCM5  | Requirements to assess ventilation provision in retrofit. | Some 80% of dwellings will still exist in 2050 but are built to very poor thermal standards. Retrofit is necessary to raise thermal performance to meet climate change targets, but it is vital the retrofit measures do not compromise IAQ | The majority of the population will continue to live in existing buildings, and these also have poor performance in terms of cold and damp. Improvements are needed in any case, but recent studies have indicated that thermal improvements without improving ventilation can make conditions worse. Guidance is needed on the use of ventilation in retrofit.  | <https://shop.bsigroup.com/ProductDetail?pid=000000000030390699>Hamilton I, Milner J, Chalabi Z, et al (2015) Health effects of home energy efficiency interventions in England: a modelling study. BMJ open 5(4), e007298  |
| 74 | The Dirac Foundation | Specification of Ventilation Rates, including for different locations of homes. | Advice is needed for stakeholders regarding optimal ventilation rates (VR) defined as volume of internal air replaced by same volume of external air per unit time. This is not only in regard to effectiveness, but also because ventilation removes of indoor pollutants but replaces them by any external pollutants. | Because if we cannot properly quantify what is meant by ameliorating indoor air pollution, it lacks a full evidence based and actionable basis. | This VR issue of course applies particularly (but by no means solely) to homes in certain environments – see my note below in “Additional developmental areas of emergent practice”. One of my main interests is in comparing and reconciling US and UK studies and remedies and I do not think we should confine ourselves to UK national studies. For discussion on VR see <https://www.epa.gov/indoor-air-quality-iaq/improving-indoor-air-quality>, noting that although this is a US national grey report (of the United States Environmental Protection Agency ) and secondary source, Dr Fisk cited there sits the .International Academy of Indoor Air Sciences. A good orientation of the US studies on this is at <https://www.youtube.com/watch?v=ornbydTAW_k&feature=youtu.be> |

**Regulations and standards**

| **ID** | **Stakeholder** | **Key area for quality improvement** | **Why is this important?** | **Why is this a key area for quality improvement?** | **Supporting information** |
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| 75 | Allergy UK | Development of guidelines and policies for building regulations to reduce risk factors associated with allergy and respiratory disease  | Increase awareness of the effects of poor ventilation and use of volatile building materials and furnishings can have on the health of individuals especially infants and children. Numerous research studies have found that poor ventilationMoulds, indoor allergens  is a risk factor to the development of asthma and allergic condition especially in children  | Evidence to show that exposure to air pollution including indoor air contributes to the risk of developing lung disease including asthma and the development of allergic conditions in children. This will impact on health and quality in life of the individual and their family affecting schooling and work life. Respiratory disease including asthma and allergies can be a marker of chronic co-morbidity and ill health in later life contributing to increase socio economic burden. | The revised WHO guidelines due to be published in June 2021 has recognised that allergic conditions are an important health concern when devising policies for indoor air quality. The impact on quality of life with allergy and respiratory disease is a very important part of the decision-making process in policy development<https://www.rcpch.ac.uk/sites/default/files/2020-01/the-inside-story-report_january-2020.pdf><https://www.nice.org.uk/guidance/ng149>information on effects of indoor air quality and its impact available from various charitable org AllergyUK , Asthma UK, British Lung Foundation  |
| 76 | British Thoracic Society | Core standard on all new build housing regarding heating (especially reducing particulate matter and efficient systems) and ventilation - which will require an update on the existing standards to meet WHO/PHE guidelines. |  |  |  |
| 77 | Building Research Establishment | Introduce system of Indoor Air Quality ratings, similar to EPC ratings for new residential buildings. | New residential buildings are made more energy efficient, which can result in poor Indoor Air quality due to inadequate ventilation | Many studies claim that we spend around 90% of our life indoors, and that proportion could rise for the elderly, infirm and very young. People in these demographics could be more susceptible to poor air quality.The COVID pandemic has highlighted the benefits of buildings being properly ventilated to help reduce the spread of infection. | Please see:Royal College of Paediatrics and Child Health report “The inside story: Health effects of indoor air quality on children and young people” published January 2020: https://www.rcpch.ac.uk/resources/inside-story-health-effects-indoor-air-quality-children-young-people Architects Journal article “Airtightness blamed for health risks in homes” published November 2016. https://www.architectsjournal.co.uk/buildings/airtightness-blamed-for-health-risks-in-homes Ministry of Housing, Communities & Local Government study “Ventilation and Indoor Air Quality in New Homes” published September 2019. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\_data/file/835208/Research\_-\_ventilation\_and\_indoor\_air\_quality.pdf |
| 78 | Building Research Establishment | Wider post- construction pre- occupancy air quality measurements | While there are limits for TVOC and formaldehyde in Building Regulations, these are not currently measured routinely post- construction pre-occupancy, or indeed later on during occupancy | Specific VOCs formaldehyde, & particulate matter all have been linked to poor health effects. Many studies claim that we spend around 90% of our life indoors, and that proportion could rise for the elderly, infirm and very young. People in these demographics could be more susceptible to poor air quality.While occupants can contribute to poor indoor air quality, at least some of the pollutants will be due to off‑gassing from building components (e.g. paints, sealants and building materials) | Please see: Royal College of Paediatrics and Child Health report “The inside story: Health effects of indoor air quality on children and young people” published January 2020. <https://www.rcpch.ac.uk/resources/inside-story-health-effects-indoor-air-quality-children-young-people> Architects Journal article “Airtightness blamed for health risks in homes” published November 2016. <https://www.architectsjournal.co.uk/buildings/airtightness-blamed-for-health-risks-in-homes> Ministry of Housing, Communities & Local Government study “Ventilation and Indoor Air Quality in New Homes” published September 2019. <https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/835208/Research_-_ventilation_and_indoor_air_quality.pdf> |
| 79 | Building Research Establishment | Development of new pre-standards for the testing and validation of lower-cost air quality sensors / instruments and also air purification systems. | There is an increasing range of lower-cost air quality sensors on the market – some of which are of dubious validity. Similarly, many indoor air purification devices are entering the market – again sometimes of dubious validity, and in some cases with additional potential health effects (e.g. the production of ozone or formaldehyde). | Inadequately performing IAQ sensors (and also air purification systems) can provide building occupants with a false sense of security. In some cases, air purification systems can introduce additional air quality problems.The use of filtration/ purification systems can provide indoor air quality benefit – but the relationship between the use of these systems (e.g. flow throughput) and air pollution sources (outdoor ingress or indoor sources) requires more investigation and quantification to provide evidence and general guidance for effective usage. | Please see:*Breathe Easy - Volatile Organic Compounds*. Breathe Easy CIBSE Air Quality Task Group, 2019. [(PDF) Breathe Easy -Volatile Organic Compounds (researchgate.net)](https://www.researchgate.net/publication/337889741_Breathe_Easy_-Volatile_Organic_Compounds)*Formaldehyde and Total VOC (TVOC) Commercial Low-Cost Monitoring Devices: From an Evaluation in Controlled Conditions to a Use Case Application in a Real Building*. V. Goletto et al, Chemosensors 2020, 8, 8.[Chemosensors | Free Full-Text | Formaldehyde and Total VOC (TVOC) Commercial Low-Cost Monitoring Devices: From an Evaluation in Controlled Conditions to a Use Case Application in a Real Building (mdpi.com)](https://www.mdpi.com/2227-9040/8/1/8)[S0867\_EMG\_Potential\_application\_of\_air\_cleaning\_devices\_and\_personal\_decontamination\_to\_manage\_transmission\_of\_COVID-19.pdf (publishing.service.gov.uk)](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/939173/S0867_EMG_Potential_application_of_air_cleaning_devices_and_personal_decontamination_to_manage_transmission_of_COVID-19.pdf)BRE holds commercially confidential information, having carried out testing on a wide range of client equipment – both sensors and air purification units. |
| 80 | Chartered Institution of Building Services Engineers | building regulations requirements for existing homes where works are carried out | Building regulations requirements apply to homes and non-domestic buildings, but they are not comprehensive and mostly focus on ventilation, not overall air quality. This is even more a problem for existing homes, as the regulations do NOT require overall consideration of ventilation and the whole home, but focus on elements and rooms where works are carried out. In addition, the actual requirement is that ventilation should not be worse post- than pre-retrofit: this is wholly inadequate since many homes are currently poorly ventilated and with poor air quality. This is going to become even more important as carbon reduction targets drive more and deeper retrofit of the housing stock | There is ample evidence that post-retrofit air quality can worsen (e.g. insufficient rates, mould growth) e.g. the work of prof Tim Sharpe, and various parties at UCL. CIBSE have also been told by Trustmark that, in relation to retrofit works, ventilation is a clear area in need of improvements.However, retrofit is also an opportunity for air quality to IMPROVE. This should be captured in building regulations  | CIBSE have provided more detailed recommendations on this in several consultations to government, and we would be happy to provide them (or a summary) to NICE. The latest is our response to the Future Buildings Standard: <https://www.cibse.org/getmedia/e0e512ca-a985-4c08-a068-27484bd27d34/FBS-Consultation-CIBSE-response.pdf.aspx> |
| 81 | Chartered Institution of Building Services Engineers | Performance based indoor air quality standards | While recommended levels exist for a large number of pollutants (e.g. Public Health England, WHO) and are increasingly incorporated into industry guidance (e.g. CIBSE TM40), there is still debate, in practice, about how to determine a realistic approach in terms of design measures and pollutants (how to know which ones matter on each project, what is a realistic monitoring approach etc) | In the absence of performance standards which can realistically be implemented in practice on the large majority of projects, there is a risk that air quality approaches will continue to focus on ventilation alone (if anything), or install monitoring for some pollutants without identifying others which need attention etc. These standards could for example be incremental e.g. “do this for these pollutants; in case of x and y, also monitor this other one / install that other measure |  |
| 82 | SCM2 | Landlord and building regulations relevant to IAQAH | Current landlord and building regulations do not sufficiently address IAQAH, leaving too much to landlords, developers, and builders to decide as to prioritisation of IAQAH measures. | Greater responsibility on landlords, developers, and the building industry would make a substantial impact at addressing poor IAQAH. | NICE Indoor air quality at home Guideline, January 2020;NICE Indoor air quality at home: [1] Evidence review for associations between individual or building characteristics and exposure levels, Jun 2019;NICE Indoor air quality at home: [3.3] Evidence review for ventilation design and use, June 2019;BRE Trust, Ensuring good indoor air quality in buildings, March 2019;HM Government, Homes (Fitness for Human Habitation) Act 2018 Guidance, March 2019 |
| 84 | SCM5  | Improved ventilation standards to maintain good IAQ | Ventilation standards are primarily directed at control of moisture and there is an assumption that this will provide sufficient ventilation to reduce pollutants. However, standards do not vary depending on the internal loads (e.g. intensity and type of occupancy, pollutant sources), built form (e.g. flats, houses, shapes, location), or external factors (e.g. adjacent to external pollutant sources) | Whilst there is good evidence of links between poor ventilation and health, there is less evidence of the levels of ventilation needed to maintain acceptable IAQ, particularly under varying conditions. However, standards are emerging and can form the basis of guidance for designers, regulators and occupants. | <https://www.gov.uk/government/publications/ventilation-and-indoor-air-quality-in-new-homes><https://www2.gov.scot/Resource/0046/00460968.pdf>[IEA EBC Annex 68-Indoor Air Quality Design and Control in Low Energy Residential Buildings-Setting the Metrics](https://scholar.google.com/scholar?oi=bibs&cluster=8059788160217697114&btnI=1&hl=en)MO Abadie, P Wargocki, C Rode - 2016 [https://www.aivc.org/sites/default/files/TN68\_Heath&Ventilation.pdf](https://www.aivc.org/sites/default/files/TN68_Heath%26Ventilation.pdf) |
| 85 | SCM5  | Improved compliance with building regulations and standards through performance testing | In use compliance with regulations and standards has been shown to be poor. There is therefore a need to undertake more rigorous testing of the application of building regulations and standards in completed buildings | Currently much regulatory compliance is achieved at design stages, with very little on-site or post competition testing against regulations. Post construction testing and compliance is necessary to ensure that standards are being met in buildings. | <https://www.gov.uk/government/publications/building-regulations-approved-documents-l-and-f-consultation-version><http://www.zerocarbonhub.org/current-projects/performance-gap> |

**Additional areas**

| **ID** | **Stakeholder** | **Key area for quality improvement** | **Why is this important?** | **Why is this a key area for quality improvement?** | **Supporting information** |
| --- | --- | --- | --- | --- | --- |
| 86 | Allergy UK | Improve access to medications / treatments such as biologic therapies and immunotherapy for allergens such as house dust mite, animal dander and pollens that will reduce the symptomatic effects of allergic disease | We are unable to eradicate many indoor allergens – there are measures we can take to reduce the level of allergen in the home for people with mild allergy but with more severe allergy access to treatments such as immunotherapy and biologic therapies can be life changing | Estimated we currently spend around 90% of our time indoors between home, school and working environments – (and with current covid restrictions possibly higher) this is a lot of exposure to allergens that we are unable to avoid. Immunotherapy has been proven to be very effective at symptom reduction and improving quality of life where the allergen source has been detected | Guidelines for immunotherapy and biologic therapies for allergy <https://www.bsaci.org/guidelines/bsaci-guidelines/immunotherapy-for-allergic-rhinitis/><https://pubmed.ncbi.nlm.nih.gov/28940458/>[https://www.annallergy.org/article/S1081-1206(18)30156-X/fulltext](https://www.annallergy.org/article/S1081-1206%2818%2930156-X/fulltext) |
| 87 | Asthma UK and British Lung Foundation | Ensure every patient is offered help with smoking cessation, especially pregnant women1. GPs ask all patients at every consultation if they smoke and if they would like help quitting
2. Commissioners provide funding for smoking cessation services to be available free of charge through the NHS to any patient who asks for help with quitting

Patients at every opportunity are encouraged to quit smoking when they come into contact with a healthcare professionals and services are available to help them to quit | Smoking is a major source of pollutants indoors and will dominate exposure to air pollutants for smokers and their co-habitants.Every time someone breathes in secondhand smoke, they breathe in over 4,000 chemicals, many of which are highly toxic and over 60 are known to cause cancer. Some of these chemicals are known to take approximately three hours to reduce to safe levels. Secondhand smoke is therefore a real and substantial threat. For adults this increases their risk of respiratory and cardiac ill health, including fatal heart attacks. Children are particularly vulnerable to the harms from tobacco smoke because of their developing lungs. Exposure to secondhand smoke in the home ismajor hazard to children and increases their susceptibility to lower respiratory tract infections such as pneumonia and bronchitis, worsening of asthma, middle ear disease, decreased lung function, bacterial meningitis, and sudden infant death syndrome. (Action on Smoking and Health, ‘Smoking in the home: New solutions for a Smokefree Generation’, 2018)Exposure of children to passive smoking costs the NHS in England up to £12 million in hospital costs. (RCP, ‘Hiding in plain sight Treating tobacco dependency in the NHS’, 2018)Government data shows that 9% of people report being exposed to smoking in their own home and 9% report having had exposure in other people’s homes (Action on Smoking and Health, ‘Health inequalities and smoking, 2016)Less well-known is that tobacco smoke can be absorbed by surfaces in the home, and chemically react with other indoor pollutants. This is referred to as third-hand tobacco smoke.Smoking is linked with the onset and exacerbation of asthma – 53% of people with asthma say that smoke impacts their asthma. (Asthma UK, ‘On the edge: How inequality affects people with asthma’, 2018) | In recent years, the trend has been away from preventative treatment: in England, there has been a 75% decline in stop smoking treatments prescribed by GPs and pharmacists [British Lung Foundation, (2018) Less Help to Quit: What’s happening to stop smoking prescriptions across Britain]High quality stop smoking services should be made accessible to all those who want to quit smoking, and all healthcare professionals should be trained in offering advice on smoking cessation. | Patient records Action on Smoking and Health national surveys on smoking and behavioural habits  |
| 88 | CETEC | Evidence base for energy efficiency policies | Need more actual measured data on pollution levels in homes to better understand the scale of the problem and feasibility of various solution options. |  |  |
| 89 | CETEC | Relationship between pollution exposure and over heating | A different form of air quality, but none the less one that most probably the public are attuned to. Need to also understand whether overheating exacerbates interactions between individual indoor air pollutants leading to greater impacts on health for the most vulnerable.  | Research has drawn a link between levels of particulates in buildings and overheating. The latter can exacerbate the former. More work is needed to understand this relationship given that the drive towards ever air tight homes is increasing the incidence of overheating.<https://journals.sagepub.com/doi/pdf/10.1177/0143624414566474> |  |
| 90 | Chartered Institution of Building Services Engineers | guidance on combined exposure | Most guidance on indoor environmental factors which affect health outcomes addresses these factors separately. However, in real life, they are very often combined (e.g. several pollutants, some of them reacting with each other; air pollution as well as other stressors such as noise and heat). It would be useful for guidance to be developed on how to approach these multi-stressor environments | Multi-stressor environments are the reality in most buildings. While margins are built into the guidance on individual factors, it is not known whether this suitably accounts for situations such as a home near a busy road, where occupants may be exposed at the same time to poor air quality, noise, and overheating. While useful to all, this would probably be of particular benefit to reduce health inequalities, since such situations are known to be more common in areas of lower incomes (ref: Prof Marmot’s work) |  |
| 91 | Chartered Institution of Building Services Engineers | indicators for microbial pollution | Compared to other air pollutants, for which recommended air quality outcomes (= levels) are provided, microbial pollutants are typically controlled through guidance on design measures (ventilation, relatively humidity), not the pollutants themselves. This may be supplemented by recommended CO2 levels as indicator of ventilation effectiveness against human occupancy, as for example during the current pandemic. It would be useful for this approach to be reviewed by NICE, for thorough health-based advice.  |  |  |
| 92 | CO-Gas Safety, the Carbon Monoxide & Gas Safety Society | Testing every dead body for CO and ideally other toxins in the products of combustion. See <http://www.co-gassafety.co.uk/about-co/other-toxins/> | Baroness Finlay of the All Party Parliamentary Carbon Monoxide Group also recommended this in 2011. Unless and until this is done it is not possible to know for sure how many people die as a result of immediate carbon monoxide poisoning. I quote at number 7. ‘The Government should ensure that all coroners’ post-mortems routinely test for carboxyhaemoglobin levels, recording death from carbon monoxide poisoning as a distinct category and to notify this to a central register if a verdict is recorded only in the narrative section of the coroner’s certificate.’CO-Gas Safety’s comments follow in blue.Excellent. We have been pressing for automatic testing of dead bodies for CO for years. Notifying a central register sounds good but care would have to be taken to make sure that deaths from house fires and suicide were excluded.A protocol was being worked on for this, but it seems to us that there has been endless delay in this. The Gas Safety Trust has funded a pilot which originally sought to develop a protocol to test all dead bodies for CO. This started in early 2016 and has not yet been published. The update is that the report is currently being reviewed and will be published in the coming months.  There have been issues which have caused significant delays primarily due to the need to reflect and capitalise on recent legislative changes. Gas Safety Trust - GST@electralink.co.uk |  | It is difficult to provide evidence because it’s Catch 22 – until this is done, at least for a year, nobody really knows how many people die from CO. As it is almost impossible for an ordinary person to obtain a test of gas appliances or any other appliances for CO it is not possible to know. Please see <https://www.newlawjournal.co.uk/content/co-the-hidden-dangers> However, the research done by the respected universities and the WHO guidelines on CO levels do seem to show that at least 5 million people in the UK are being exposed to levels of CO well above the WHO guidelines. Why aren’t all dead bodies tested for CO and why doesn’t the gas emergency service carry and use equipment to test gas appliances for CO? Surely this is just common sense? See WHO guidelines for indoor air quality:selected pollutants 15.12.10ISBN 978 92 890 0213 4<http://www.euro.who.int/__data/assets/pdf_file/0009/128169/e94535.pdf>See page 70 second para from the bottom.Walker (130) states that the incidence of chronic carbon monoxide exposurein Great Britain is officially 200 per year, while at the same time “250 000 gas appliancesare condemned annually”. He speculates that if only 10% of these appliancesgive off significant amounts of carbon monoxide that reach the breathingspace of residents, as many as 25,000 people every year may be exposed to carbonmonoxide in their homes. The carbon monoxide support study (89) found thatonly one case out of 77 was correctly identified (i.e. diagnosed) on the basis ofsymptoms alone and that medical professionals were the least likely group todiscover the fact of the carbon monoxide poisoning.See also page 86GuidelinesThe 24-hour guidelineChronic carbon monoxide exposure is different from acute exposure in severalimportant respects, as noted above. Thus, a separate guideline is needed to addressminimal exposure over 24 hours, rather than the 8-hour period used inthe acute guidelines. The latest studies available to us in 2009, especially thoseepidemiological studies using very large databases and thus producing extremelyhigh-resolution findings, suggest that the appropriate level for carbon monoxidein order to minimize health effects must be positioned below the 8-hour guidelineof 10.5 mg/m3, possibly as low as 4.6–5.8 mg/m3. This is also essential sincethe minimal exposure time for this guideline is three times longer.'Note to explain these levels10.5 mg/m3 = 8.9 Parts Per Million so call it 9 PPM4.6 mg/m3 = about 4PPM'Please check that CO-Gas Safety has got this right and let us know if not.  |
| 93 | CO-Gas Safety, the Carbon Monoxide & Gas Safety Society | Industry should be levied to provide funds for raising awareness, improved training etc., testing of appliances free for those who wish it and for funding an organisation that does what CO-Gas Safety has been doing since 1995 on a shoestring with almost no funding. Gather data and helping victims is research. From doing this work we learn why deaths and injuries happened and how to prevent them. Also CO alarms to EN 50291 ideally with sealed batteries or mains powered (replaceable batteries are allowed under EN 50291) should be mandatory for rented property and ideally all property and work places. However, the CO alarm even to EN 50291 and even when purchased direct from a reputable supplier only works when unwrapped and set up. Also it is more of a death alarm than a health monitor. |  Our case studies show the need for our work. |  | Although there are two wealthy gas charities CO-Gas Safety is the only body that offers free and specific support for victims of CO. Furthermore, there seems to be no other body that represents victims which makes submissions such as filling up this form. All other bodies either fail to do this work or represent industry and not victims. Victims of carbon monoxide are the ultimate ‘mystery shopper’ and tend to come up with the most sensible ways to prevent deaths and injuries. We put forward the most cost effective suggestions and lobby MPs and bodies such as the All Party Carbon Monoxide Group but it isn’t making much progress. I have run this charity for 25 years helped by other voluntary directors, mainly victims but also MPs and one industry representatives. We have built up a database of deaths where over 95% of our deaths have some official confirmation (mainly from Coroners) and expertise in prevention. Yet it seems unlikely that I will even be allowed to address a conference at IGEM (Institute of Gas, Engineers and Managers, of which I am a member) about CO in November 2020 about our work and what needs to be done. I am also a barrister. The fuel industry seems to me to be ossified circa 1950 and refuses to use embrace technology to raise its own standards which at times, are in my opinion, dangerous and/or grossly unfair. For example, 8.2 of the Gas Safe Register’s policy. <https://www.gassaferegister.co.uk/media/2376/p001_con001-consumer-policy-our-service-explained-v71.pdf> and for tenants see 8.2 which says the following:- ‘If you are a tenant, we will seek permission from your landlord before undertaking our investigation. However, if you do not wish to engage your landlord, we will only be able to conduct a visual inspection of the installation. Whilst we accept your request this will limit the extent and effectiveness of our investigation into your complaint. Note: Where we identify gas related safety defects we may be obliged to inform your landlord or their agent, where known.’If work is done by a Registered Gas Engineer in the past 6 months, an inspector from the GSR can be asked to attend free and will test the gas appliances for CO. However, if the person asking for this free service is a tenant, the inspector will only test for CO with the landlord’s permission. Why is the safety of the tenant left to the landlord in such a situation?We have a comic strip to illustrate this difficulty please see pages 12 & 13 of <https://www.co-gassafety.co.uk/information/press-pack-2020/> In our opinion, industry only pays lip service if that to the need for awareness and prevention and industry seems very powerful. Surely such a wealthy industry should be at least financially supporting a body which offers victim support and finds out what needs to be done to prevent future victims? We have offered our help to set up an independent body to do what we do but properly set up and funded. We don’t want to continue doing this voluntary work but fear that if we stopped, the work would stop too and there would be no support for victims and no conduit from their experiences to those with power to improve safety and save NHS and taxpayer’s resources (for example fill up this form). Industry would continue to rely on lack of knowledge to refuse to make improvements to safety and would also incidentally fail to improve to lower emissions. Emissions from heating and cooking appliances contribute to overall global pollution and thereby climate change. It is high time Government woke up to this and helped reduce global emissions by imposing a levy on the fuel suppliers as recommended in 2000 by the HSE and used that to at least deal with the first two matters below and the further suggestions:-1. Improve indoor air by raising awareness of the dangers of CO by a funded public health campaign.
2. Require all gas emergency operatives to carry and use equipment to test gas appliances for CO and at least test the air in the living space with regard to other fuels,
3. Fund a body such as CO-Gas Safety to monitor deaths and injuries, help victims and suggest changes to reduce deaths and injuries and raise awareness. Also fund further research when required.
4. Require mandatory CO alarms to EN 50291 to all rented property and we submit all homes and workplaces, bought direct from reputable suppliers, not the Internet.
5. Require that the landlord’s mandatory gas safety check includes either a mandatory service or a test of the flue gasses. Also to check the mandatory CO alarm is working and in date.
6. Require mandatory registration and training on installers and maintainers of appliances powered by all fuels.

Require automatic testing of dead bodies for CO. |
| 94 | CO-Gas Safety, the Carbon Monoxide & Gas Safety Society | Gas installers & maintainers of gas appliances must be registered by law. Other fuels need the same. |  Because registration would assist accountability and registration also governs training. In our opinion training could be improved for gas but is even worse for other fuels. New software could also help with accountability e.g. Gas Tag see <https://gastag.co.uk/> We have had no help or support from Gas Tag but we think this is a brilliant system. |   | Case studies, research and talking to victims have revealed that installers of gas appliances can be poor in knowledge and training but those installing and maintaining other fuelled appliances are infinitely less well informed and some have had no training. This is obviously extremely dangerous. I am sure we could give or pass on to you the names of Registered Gas Engineers who would be happy to support what we have said. I would have asked for their permission to add to this form but I’m pushed for time and doing it at the last minute.  |
| 95 | Council for Gas Detection and Environmental Monitoring  | Encourage UK-specific kitchen pollutant studies |  |  |  |
| 96 | Council for Gas Detection and Environmental Monitoring | Fund studies through NERC, BBSRC or Innovate UK |  |  |  |
| 97 | PPM Technology Ltd | [Comment appears to relate to Public Health England’s Indoor Air Quality Guidelines for selected Volatile Organic Compounds in the UK]The guideline levels should be more consistent with each other. | For example Short term is defined as 30 mins, then 1 hour for another chemical. The same applies to long term limits. It confuses the end user monitoring the gas levels. | Making air monitoring easy and user friendly is the key to ensuring the monitoring is done properly/ successfully. |  |
| 98 | PPM Technology Ltd | [Comment appears to relate to Public Health England’s Indoor Air Quality Guidelines for selected Volatile Organic Compounds in the UK]The proposed Formaldehyde long term level of 10ug/m3 is unachievable to measure. | PPM Technology have 25 years experience in and are world leaders in Formaldehyde monitoring The levels given are unmeasurable using non laboratory based methods monitoring methods. Real time long term monitoring would be more favourable. | Making monitoring easy ensures that levels are adhered to. Long complicated methods which for analysing the air are impractical. |  |
| 99 | SCM1 | A recommendation to include indoor air quality and ventilation in the update of the HHSRS currently underway. | Although there is reference to ventilation in relation to other hazards in the HHSRS, there is no specific measure to deal with poor indoor air quality or a specific hazard relating to ventilation. The COVID pandemic has reinforced the importance of ventilation.  | The HHSRS is the method used by Environmental Health Officers to improve conditions in the most problematic housing.  | MHCLG: Operating Guidance HHSRSMHCLG: HHSRS Outcomes of the Scoping Review |
| 100 | SCM3  | A national fund to help low income households | To avoid the inequity of deprived people being unable to reduce their exposure to poor indoor air quality | Poor people are more exposed and susceptible to harmful levels of air pollution and this is very likely to be the case with indoor air. They are also less able to be able to fund necessary improvements adaptations | RCPH report 2020 The inside story: Health effects of indoor air quality on children and young people RCP Report 2016 Every breath we take: the lifelong impact of air pollution |
| 101 | SCM3  | Establish a national cross-government body to lead and coordinate indoor air quality policy, standards and actions |  | Tackling indoor air quality requires the involvement of multiple agencies and disciplines. The necessary actions can only be successfully delivered within a national framework with accepted and consistent standards. This requires national strategy and oversight. Current legislation focuses on energy efficiency to the detriment of indoor air quality and many house builders are not currently complying with ventilation standards | RCPH report 2020 The inside story: Health effects of indoor air quality on children and young people  |
| 102 | SCM5  | Additional developmental areas of emergent practice | Standards for measurement of IAQ in homes. | More data is needed in IAQ in homes, but collection of environmental data in private homes presents a number of technical and ethical challenges. Guidance is needed on methods of data collection, types of sensors, placement, longevity. Work is also needed to examine what this data is, to whom it belongs, and what it may be used for. |  |
| 103 | The Dirac Foundation | Further study is required to adjust recommendations to locations of residence to consider the accumulative load of indoor air quality and outdoor air quality, e.g. for homes near airports, busy roads, smog, petrol stations and garages, landfill and waste dumps, industrial sites and farm sites of allergenic plants . | Because effects of different forms of pollution can be accumulative and likely mutually potentiating. | E.g. see Robson B. (2016), “Studies in Using a Universal Exchange and Inference Language for Evidence Based Medicine. Semi-Automated Learning and Reasoning for PICO Methodology, Systematic Review, and Environmental Epidemiology”, Computers in Biology and Medicine, 79, 299–323. | Further study is required to adjust recommendations to locations of residence to consider the accumulative load of indoor air quality and outdoor air quality, e.g. for homes near airports, busy roads, smog, petrol stations and garages, landfill and waste dumps, industrial sites and farm sites of allergenic plants . |

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Décret n° 2011-321 du 23 mars 2011 relatif à l'étiquetage des produits de construction ou de revêtement de mur ou de sol et des peintures et vernis sur leurs émissions de polluants volatils. https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000023759679/ [↑](#footnote-ref-20)