

# NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE

## Guideline scope

### **Air pollution: outdoor air quality and health**

#### ***Topic***

The Department of Health in England has asked NICE to produce guidance on reducing the ill-effects of outdoor air quality on health. It will focus on how local authorities can reduce exposure to air pollution from road traffic.

This guideline will also be used to develop a NICE quality standard on air pollution.

#### ***Who the guideline is for***

- Local authority staff working in:
  - public health, including environmental health
  - transport
  - planning
  - local air quality management.

It may also be relevant for:

- Healthcare professionals in primary and secondary care.
- Local government elected members.
- Employers in all sectors (including transport operators), local enterprise partnerships members, and local businesses and developers.
- People working in:
  - the voluntary sector and non-governmental organisations
  - education.
- The general public.

NICE guidelines cover health and care in England. Decisions on how they apply in other UK countries are made by ministers in the [Welsh Government](#), [Scottish Government](#), and [Northern Ireland Executive](#).

## ***Equality considerations***

NICE has carried out [an equality impact assessment](#) during scoping. The assessment:

- lists equality issues identified, and how they have been addressed
- explains why any groups are excluded from the scope, if this was done.

# **1 What the guideline is about**

## ***1.1 Who is the focus?***

The guideline will cover the whole population. There will be a particular focus on people who live or work in places with road-traffic-related air pollution 'hot spots' (this includes locations predicted to exceed, or that already exceed, air quality objectives and [air quality management areas](#) designated by the Department for Environment, Food and Rural Affairs) and those at particular risk (this includes children aged 14 and under, older people aged 65 and older, pregnant women and people with pre-existing respiratory or heart problems).

## **1.2      *Activities, services, interventions or aspects of care that will be covered***

Local authority interventions to reduce road-traffic-related emissions by: reducing overall mileage (particularly by highly polluting vehicles); altering the type of fuel used or driving style; aiding dispersion or deposition of pollutants; supporting the uptake of abatement technologies (such as Euro 6/VI vehicle standards); and altering personal behaviour to reduce exposure to pollutants. This includes:

1. Environmental change and development planning:
  - Planning and land allocations, development control and planning decisions, urban space and building design:
    - ◇ siting, layout and design of developments
    - ◇ the application of planning conditions or obligations.
  - Developing public transport routes and services, including developing bus lanes and improving bus quality.
  - Developing routes and infrastructure to support low emission modes of transport:
    - ◇ cycle routes or pedestrianised areas
    - ◇ low emission public sector vehicle fleets
    - ◇ options for siting of routes for example, to avoid inclines and reduce traffic levels.
  - Measures to promote absorption, adsorption or impingement deposition, and catalytic action including:
    - ◇ natural and artificial barriers (such as trees and foliage)
    - ◇ surface treatments (such as titanium oxides)
    - ◇ dust suppressants (such as calcium magnesium acetate).
2. Traffic management and enforcement, and financial incentives and disincentives:
  - Traffic management systems and signal coordination:
    - ◇ road signs, traffic signals and road markings
    - ◇ lane control
    - ◇ traffic calming measures

- ◇ vehicle bans or restrictions
  - ◇ elements of routes (such as positioning of traffic lights)
  - ◇ roadside emission testing.
  - Zoning, including low (and ultra-low) emission zones:
    - ◇ congestion charging
    - ◇ cordons or zones
    - ◇ distance-based charging
    - ◇ speed management zones
    - ◇ keep clear zones
    - ◇ time-based charging
    - ◇ toll road charging.
  - Parking restrictions and charges:
    - ◇ restricted parking zones (including low emission vehicles, car clubs and electric vehicle recharging points)
    - ◇ higher parking charges
  - Vehicle ‘idling’ restriction and charges including waiting and loading restrictions.
3. Initiatives providing information, advice, education or to develop skills for:
- Travel planning (this includes awareness raising and education to encourage people to use alternatives to a car):
    - ◇ Settings-based travel planning (such as in workplaces, new residential developments or schools):
      - traffic-free routes and route design to reduce exposure and make use of urban barriers
      - car sharing schemes
      - car parking
      - improved facilities to encourage cycling or other non-motorised travel
      - cycle-to-work schemes
      - policies relating to business travel, including using public transport rather than driving, or incentives for businesses to promote cycling at work

- management of deliveries and products to minimise air pollution
  - interest-free season ticket loans
  - signage and cycle parking
  - lighting and planting.
- ◇ Personalised travel planning to provide individuals with information, education, incentives and motivation to support low emission travel choices.
    - Information, education and training on fuel, vehicles (including zero-emission vehicles) or route choice.
    - Information, education and training on driving styles, including the need to avoid heavy acceleration and minimise braking and excessive speed.
4. Advice and warnings for the public and people at particular risk:
- air pollution forecasts and real time data
  - air pollution early warning alerts via text or emails
  - air pollution early warning or monitoring information via web- or app-based geographical systems.

### **1.3 *Economic aspects***

We will take economic aspects into account when making recommendations. We will develop an economic plan that states for each review question (or key area in the scope) whether economic considerations are relevant, and if so whether this is an area that should be prioritised for economic modelling and analysis. We will review the economic evidence and carry out economic analyses, using public sector and/or societal perspectives, as appropriate.

### **1.4 *Key issues and questions***

While writing this scope, we have identified the following key issues, and key questions related to them:

1. Are each of the environmental change and development planning interventions listed in section 1.2 (part 1) effective and cost effective at

reducing the health impact of, or people's exposure to, traffic-related air pollution?

2. Are each of the traffic management and enforcement interventions, and the financial incentives and disincentives, listed in section 1.2(part 2) effective and cost effective at reducing the health impact of, or the public's exposure to, traffic-related air pollution?
3. Are each of the information, education and training initiatives listed in section 1.2(part 3) effective and cost effective at reducing the health impacts of, and the public's exposure to, air pollution?
4. Are each of the initiatives that provide advice and warnings listed in section 1.2(part 4) effective and cost effective at helping people to change their behaviour to reduce the health impacts?

All key questions will, if the data are available, also identify:

- whether the impacts vary for different population groups (including those with pre-existing health conditions)
- whether there is evidence of any adverse effects such as road injuries or other health impacts as a result of the interventions
- the context in which interventions should be delivered.

The key questions may be used to develop more detailed review questions to guide the systematic reviews of the literature.

## **1.5 Main outcomes**

The primary outcomes that will be considered when assessing the evidence are:

- Health-related outcomes attributed to road-traffic-related air pollution including:
  - mortality
  - rates of cardiovascular disease, respiratory disease, cancer
  - asthma exacerbations and symptoms
  - inflammatory response, respiratory or cardiac symptoms or parameters
  - hospital admissions

- attendance at primary care
- symptoms and signs of cardiovascular or respiratory disease.

The secondary outcomes that will be considered when assessing the evidence are:

- Changes in road-traffic-related air pollution levels (in particular, levels of nitrogen oxides and particulates) measured in terms of:
  - personal exposure
  - background levels
  - kerbside levels
  - hot spots.

Factors associated with changes in air pollution levels:

- total emissions.
- types of vehicles used in England (percentage of vehicles using diesel, petrol and other fuels)
- vehicle mileage
- fuel economy
- changes to the make-up of the vehicle fleet (for instance, compliance with Euro 6/VI or other standards).

## **2 Links with other NICE guidance and NICE Pathways**

### **2.1 NICE guidance**

**NICE guidance that will be incorporated unchanged in this guideline**

- [Walking and cycling](#) (2012) NICE guideline PH41
- [Physical activity and the environment](#) (2008) NICE guideline PH8

## 2.2 *NICE quality standards*

**NICE quality standards that may use this guideline as an evidence source when they are being developed**

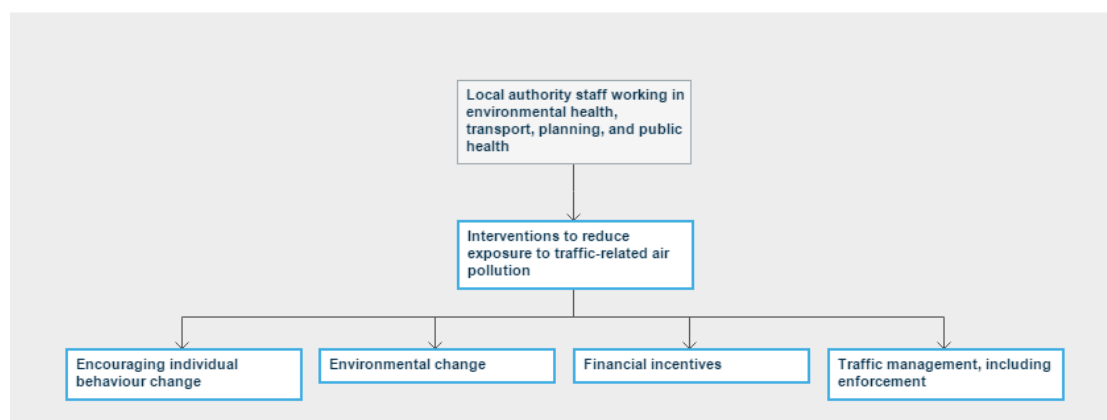
- Outdoor air: health effects

## 2.3 *NICE Pathways*

When this guideline is published, the recommendations will be added to [NICE Pathways](#). NICE Pathways bring together all related NICE guidance and associated products on a topic in an interactive topic-based flow chart.

A draft pathway outline on air pollution, based on the scope, is included below. It will be adapted and more detail added as the recommendations are written during guideline development.

Air pollution overview



## 3 **Context**

### 3.1 *Key facts and figures*

The major human sources of air pollution are the combustion of fuels for heat, electricity and transport.



In this guideline, 'road transport-related air pollutants' refers primarily to particulate matter<sup>1</sup> and nitrogen oxides. Road transport is a major source, accounting for 31% of nitrogen oxides, 18% of PM<sub>10</sub> and 19.5% of PM<sub>2.5</sub> emissions in the UK. Ozone is a secondary pollutant produced by the photochemical reactions of various compounds, many of which are produced by road traffic and other combustion sources.

Road traffic frequently accounts for more than 64% of air pollution at urban monitoring sites. ([Road traffic's contribution to air quality in European cities](#) European Topic Centre on Air Pollution and Climate Change Mitigation).

Emissions from road transport come from exhausts and from other sources (predominantly from the direct wear of tyres, brakes and the road). As exhaust emissions are reduced through emission standards and the total distance travelled increases, non-exhaust emissions have become relatively more important. In 2010, it was estimated that 21% of PM<sub>2.5</sub> emissions and 33% of PM<sub>10</sub> emissions were from non-exhaust sources ('Road traffic's contribution to air quality in European cities').

The effect of particulate air pollution on mortality in the UK in 2008 was estimated as being equivalent to nearly 29,000 deaths at typical ages of death, associated with a total of 340,000 life-years lost. It is not clear how this mortality burden is distributed across the population. If air pollution had contributed to all deaths in 2008, this would be equivalent to an average loss of 6 months of life. If it had been the sole cause of death of only 29,000 people, the average loss of life would have been approximately 11½ years.

The Committee on the Medical Effects of Air Pollutants (COMEAP) has suggested that it is more reasonable to assume air pollution may have made some contribution to the deaths of all of those who died of cardiovascular causes. If this were the case, the average loss of life would have been about 2 years for each person affected. See [The mortality effects of long-term](#)

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<sup>1</sup> Particulate matter is usually classified according to the diameter of the particles. PM<sub>10</sub> refers to particulate matter up to 10 microns, PM<sub>2.5</sub> is matter up to 2.5 microns.

[exposure to particulate air pollution in the United Kingdom](#) (Committee on the Medical Effects of Air Pollution) for an explanation of the mortality estimates.

[Understanding the health impacts of air pollution in London](#), from King's College London, found that in 2010 PM<sub>2.5</sub> was linked to around 52,500 life-years lost. It also estimated that up to 88,000 life-years are lost because of long-term exposure to NO<sub>2</sub>, giving a total of up to 140,743 life-years lost due to air pollution from particulates and NO<sub>2</sub>.

The health impact of PM<sub>2.5</sub> pollution from human activities in the UK is estimated to cost between £8.5 billion and £18.6 billion a year (using 2005 data and an approach based on willingness to pay to avoid the health effects) ([Ambient air quality](#) UK Parliament).

Over recent decades there has been a reduction in air pollutant emissions. However, in 2013 in the UK, levels of nitrogen dioxide exceeded the [EU directive limit](#) for the protection of human health in 38 out of 43 zones.

The way air pollution is distributed across neighbourhoods is not straightforward. Often deprived areas have relatively higher concentrations of nitrogen dioxide and particulates (PM<sub>10</sub>). This is largely caused by urban road transport: a higher proportion of deprived communities live in urban areas. But high concentrations of these pollutants are also seen in the least deprived areas. In addition, rural areas tend to have higher concentrations of ozone (although many of the compounds involved in ozone formation come from road transport).

Children (aged 14 and under) and older people (65 and older) are more susceptible than average to the effects of air pollution ([Air quality and social deprivation in the UK: an environmental inequalities analysis](#) Department of Environment, Food and Rural Affairs). Some groups are more susceptible to short-term exposure to high levels of pollution than others. However, current evidence suggests that long-term exposure causes the most health problems.

Addressing air pollution, for instance by encouraging people to walk and cycle rather than drive, can help people to become fitter and healthier. It can also

help reduce greenhouse gases that contribute to climate change. Climate change is linked to increased risk of extreme weather and other events that have an adverse effect on health, such as floods, heatwaves and the spread of some infectious diseases.

### **3.2 Current practice**

Local authorities are required to review and assess air quality against the objectives set out in the UK's Air Quality Strategy (see below) every 3 years (with progress reports in intervening years). Where this shows that levels have been exceeded, the local authority must declare an air quality management area and develop an action plan to tackle the problems.

Most air quality management areas have been in response to emissions associated with road transport and actions tend to focus on road-transport-related activity. This includes: creating clean or low-emission zones, traffic management schemes and work with other authorities (such as Highways England).

### **3.3 Policy, legislation, regulation and commissioning**

The [Air Quality Strategy for England, Scotland, Wales and Northern Ireland](#) (Department for Environment, Food and Rural Affairs) sets out UK air quality standards and objectives for reducing levels of health-threatening pollutants. All these standards, except those for ozone and polycyclic aromatic hydrocarbons, are subject to regulations under the [Environment Act 1995](#) and many are the result of the UK incorporating European law.

The EU sets legally binding limits for levels of major air pollutants under an [ambient air quality directive](#).

The Department for Environment, Food and Rural Affairs is consulting on '[Air quality: draft plans to improve air quality](#)' and is developing guidance to help local authorities identify and implement measures to improve air quality.

The UK's Air Quality Strategy sets objectives for reducing: particulate matter; nitrogen dioxide; ozone; sulphur dioxide; polycyclic aromatic hydrocarbons

(benzo[a]pyrene); benzene, 1, 3 butadiene; carbon monoxide and lead. There are no objectives for ammonia, but there is an agreed national emission ceiling. Ammonia affects health because it interacts with acids produced by gases in vehicle exhaust to form secondary particulates.

The [Public Health Outcomes Framework](#) includes an indicator based on all-cause adult mortality attributable to anthropogenic particulate air pollution.

Part IV of the Environment Act 1995 requires all local authorities in the UK to review and assess air quality in their area.

Pollution caused by local transport is addressed primarily through local transport planning ([2010 to 2015 Government Policy: Local Transport](#)) and the [National Planning Policy Framework](#).

This guideline will support the development of effective and cost effective interventions to address air quality. It will also help to demonstrate the positive health outcomes of tackling air pollution locally.

## 4 Further information

This is the final scope, incorporating comments from registered stakeholders during consultation. The guideline is expected to be published in May 2017.

You can follow progress of the [guideline](#).

Our website has information about how [NICE guidelines](#) are developed.