Tackling traffic related air pollution to improve public health

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What causes air pollution?

- Volcanic eruptions
- Pollens
- Forest fires
- Aircraft at take-off
  - Dust blown off soil, roads and distant deserts adds to PM
  - Aircraft at take-off add to NO₂ (cruise aircraft emissions are blown away)
- Industry
  - adds to PM and NO₂, and can release gases that turn into PM.
- Bonfires and fireworks add to PM
- Road traffic and rail
  - exhaust adds to PM and NO₂.
  - Brake, tyre and road/rail wear add to PM.
- Farming
  - adds to PM as fertiliser breaks down it forms PM.
- Shipping
  - exhaust adds to PM and NO₂
- Building and home heating
  - Gas heating makes NO₂, wood (including from CHP) and coal heating make PM.
- The sea
  - releases salt and sulphur adding to PM
Traffic related air pollution

1940s–1950s
- Sulphur dioxide
- Soot

1960s–1980s
- Carbon monoxide
- Lead
- Ozone

1980s–2000s
- Nitrogen dioxide
- Particulates

Across this period in time:
- 10x increase
- 30% decrease in walking
- 14% of new cars were diesel
- 50% of new cars were diesel

Clean Air Act 1956

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A few hours of PM$_{2.5}$ over 35µg/m$^3$ irritates the eyes, nose and throat. It can cause breathing problems and asthma attacks in sensitive people.

Years of exposure to even low levels of PM$_{2.5}$ (10-25 µg/m$^3$) can lead to lung cancer and incurable lung disease, and reduced lung function.

Ultrafine PM can get into the blood then throughout the body. Ultrafine particles have been found in bodily organs.

Very high levels of air pollution, not found in the UK, are associated with premature births and low birth weight.

COMEAP estimated the mortality burden of human-made particulate pollution in the UK in 2008 as:

- An effect equivalent to 29,000 deaths per year
- Average loss of 6 months of life expectancy from birth

Ultrafine PM has been found in samples of brain and central nervous system tissue.
Who is most at risk?

Air pollution is harmful to everyone. However, some people suffer more than others because they:

- live in deprived areas, which often have higher levels of air pollution
- live, learn or work near busy roads
- are more vulnerable because of their age (e.g. children, older people) or existing medical conditions
Annual mean background PM$_{2.5}$ ($\mu$g/m$^3$) in 2010
Air Pollution in London – Nitrogen dioxide

Source: Professor Frank Kelly (2012)
Nitrogen oxides (NO$_x$) sources

(Defra, 2015)
NICE guideline on outdoor air pollution

- **Planning** (including planning new developments, providing infrastructure to support low- and zero-emission travel, and considerations for urban vegetation and street trees)
- **Clean Air Zones** (including congestion charging zones)
- **Reducing emissions from public sector transport services and vehicle fleets** (including procuring of public sector vehicles)
- **Smooth driving and speed reduction** (including reduced speed in urban areas and physical traffic calming measures)
- **Cycle routes** (including siting and design of cycle routes)
- **Awareness raising** (for the general public, businesses, and healthcare professionals)
Defra air quality plans

Clean Air Zone

Immediate action to improve air quality and health
Supporting local growth and ambition
Accelerating transition to a low emission economy
Access restrictions to encourage cleaner vehicles

Source: Defra (2016)

NICE: Consider including progressive targets to reduce pollutant levels below air quality limits
A resource for public health teams that can be used to communicate the health effects of air pollution at a local level

- **Getting to grips with air pollution**
- **Air Pollution: a public health issue. A Briefing for elected members**
- **Understanding air pollution in your area**
- **Engaging local decision-makers about air pollution**
- **Communicating with the public during air pollution episodes**
- **Communicating with the public about air pollution**
Air Pollution and Climate Change

Need to be treated together

**Win-win**: active travel, urban greening

**Lose-win**: diesel cars, wood burning

Maximise public health co-benefits of traffic interventions

e.g. local air quality, physical activity and climate change mitigation
Next steps

• COMEAP report on nitrogen dioxide
• NICE Guideline on Outdoor Air Pollution
• DEFRA air quality plans & CAZ
• 2017 National Clean Air Day
• Report on the costs of air pollution to NHS
• Continue to develop the evidence and improve communication of the health effects associated with air pollution (outdoor and indoor)
• Build a strong coalition with Local Authorities, ADPH, Faculty of Public Health, Royal Colleges, health charities and professional bodies
• Reduce the impact of air pollution in the broader context of improving people’s health
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• Global Action Plan

Thank you!
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