

Air Quality and Health in Derby

SUMMARY

- 1.1 There is a growing evidence base that demonstrates long term exposure to air pollution is harmful at levels well below current air quality targets and is causing a significant morbidity and mortality burden in Derby City.
- 1.2 The impact of air pollution affects the whole population, however disproportionately affects the young, older people, those with underlying health conditions and the most disadvantaged within our communities.
- 1.4 Even modest decreases in air pollution can lead to population impacts including increase in life expectancy.
- 1.5 Interventions to address air quality will deliver wider public health benefits and support objectives within the health and wellbeing board strategy.

RECOMMENDATION

- 2.1 To note the impact of air quality on health.

REASONS FOR RECOMMENDATION

- 3.1 Air quality is a significant determinant of health, and is a substantial risk factor in the mortality and morbidity of the local population.
- 3.2 Improvements in air quality require joint strategic action across a range of stakeholders.

SUPPORTING INFORMATION

Background

- 4.1. By far the largest disease burden attributable to environmental exposure and management of chemicals is related to exposure to air pollution. The local mortality burden attributed to particulate matter (PM_{2.5}) air pollution in Derby City is calculated as being equivalent to 131 deaths and an associated loss to the population of 1425 life-years¹.
- 4.2 The health problems resulting from exposure to air pollution have a high cost to people who suffer from illness and premature death, to our health services and to business. In the UK, these costs add up to more than £20 billion every year, on a par with those from smoking and obesity⁴.
- 4.3 Air pollution is associated with a number of effects on health including wheezing, coughing, worsening of respiratory diseases (such as asthma and chronic bronchitis), lung cancer, early-life effects, deaths and hospital admissions from respiratory and cardiovascular diseases. The most significant effect of air pollution on public health is thought to be due to long-term exposure to particulate air pollution (PM).
- 4.4 The burden of death and ill health arising from poor air quality is experienced by all within the population and occurs across the lifespan, but disproportionately affects individuals and subgroups of the population, including those living in environments close to main transport routes, the most deprived communities, children, older people and those with pre-existing medical conditions such as heart disease and respiratory conditions.
- 4.5 Current research indicates that at a population level, no thresholds of effect can be identified for the common air pollutants. This means that there are benefits to be gained from improving air quality, even below current EU and UK limits. Reductions in population exposure to air pollution yield appreciable benefits in terms of increased life expectancy.
- 4.6 Indicator 3.01 of the Public Health Outcomes Framework measures “Fraction of mortality attributable to particulate air pollution”. Predicted mortality fractions equal or exceed the East Midlands rate of 5.7% within Derby City (Table 1).

Table 1; Fraction of mortality attributable to particulate air pollution PM_{2.5} (2013): 3.01 Public Health Outcome

Local Authority	Attributable Fraction (%)*	Attributable Deaths (Aged 25+)**	Associated Life-Years Lost***
Derby UA	5.7	131	1425
Derbyshire County Council	5.4	402	4041
Amber Valley	5.3	67	656
Bolsover	6.2	46	440
Chesterfield	5.4	59	572
Derbyshire Dales	4.5	33	306
Erewash	5.7	61	647
High Peak	4.4	39	451
North East Derbyshire	6.1	55	529
South Derbyshire	5.4	42	439

Source; * The proportion of deaths estimated to be due to long term exposure to anthropogenic particle air pollution (2013)
 Long term exposure to anthropogenic particle air pollution is estimated to have an effect on mortality risks equivalent to the number of attributable deaths. Air pollution is likely to contribute to a small amount to the deaths of a large number of exposed individuals rather than being solely responsible for the number of deaths equivalent to the calculated figure of attributable deaths (2011). *The years of life lost to the population due to increased mortality risk associated with exposure to particle air pollution (2011).

- 4.7 Further evidence and understanding of the impacts of air pollution continue to emerge. The impact of poor air quality lasts far into the future, however improvements made now will also deliver long lasting benefits in children and help older people to stay independent and well, benefiting individuals and easing the pressure on our NHS and social services.
- 4.8 Action around air quality can have far reaching benefits and could indirectly deliver improvements in a range of indicators within the Public Health Outcomes and NHS Outcomes Framework.

Sources of air pollution

- 4.9 The main anthropogenic (man-made) sources of outdoor air pollutants are traffic, fossil fuel power stations, industrial activities and cement kilns. Road transport is estimated to be responsible for up to 70% of the harm associated with air pollution⁴.
- 4.10 Nitrogen dioxide (NO₂) is a product of combustion from engines, boilers and furnaces. At relatively high concentrations, NO₂ acts as an irritant causing inflammation of the airways and, can increase susceptibility to respiratory infections, increase the sensitivity of asthmatics to allergens and increase the likelihood of asthma attacks and respiratory illnesses in children⁵.
- 4.11 Air pollutant particles or particulate matter (PM) are arguably the most important

component of ambient air with regards to health. The main sources of particles are motor vehicles and non-nuclear (e.g. coal fired) power stations. Particles found in ambient air are generally divided up on the basis of size. Smaller particles such as those represented by PM_{2.5} (particles smaller than 2.5 micrometres) are thought to have greater effects on health as they can be carried deeper into the lungs. Knowledge of the effects of particles on health comes from studies that relate short-term or long-term exposure of PM₁₀ and PM_{2.5} to population level mortality (death), and increased admissions to hospital of people suffering from cardiovascular (heart) disease and respiratory (lung) disease⁵.

Drive to improve local air quality

- 4.12 The National Air Quality Plan which outlines the requirement for the implementation of Clean Air Zones in five cities across the UK, including Derby. The Government's National Plan published in July 2017 requires Derby City Council to undertake assessments in order to design air quality measures which will ensure compliance with the NO₂ limit values within the shortest possible time. A consultation on the authority's proposals closes on the 24th September.
- 4.13 An update on 'Reducing Roadside Nitrogen Dioxide – Air Quality' was recently provided to the Health and Wellbeing Board. This update, which provides an overview of the three proposals within the consultation, is included with this paper for information.
- 4.14 In order to improve population level health, a wide range of measures are required which seek to reduce the sources of air pollution locally, facilitate modal shift, and mitigate impacts. Such measures require joint strategic working between a range of stakeholders. The Joint Air Quality Working Group, a sub group of the Health Protection Board, aims to agree strategic priorities and action based on the best available evidence. The working group is currently looking to develop a Derbyshire-wide Joint Air Quality Strategy.

4.15 References

1. Estimating Local Mortality Burdens Associated with Particulate Air Pollution, Public Health England (2014)
2. Pruss-Ustun, A., Vickers, C., Haefliger, P & Bertollini, R., 2011 Knowns and unknowns on burden of disease due to chemicals: a systematic review. Environmental Health, 10)
3. Every breath we take – The lifelong impact of air pollution. Royal College of Physicians (2016) <https://www.rcplondon.ac.uk/projects/outputs/every-breath-we-take-lifelong-impact-air-pollution>
4. Statistics on obesity, physical activity and diet: England, 2014, Information Centre for Health and Social care (2014)
5. Fine-Particulate Air Pollution and Life Expectancy in the United States, C. Arden Pope III, Ph.D., Majid Ezzati, Ph.D., and Douglas W Dockery, Sc.D., New England Journal of Medicine, 2009: 360:376-86,
6. <http://uk-air.defra.gov.uk/library/ageg/publications>
7. <http://webarchive.nationalarchives.gov.uk/20140505104700/http://www.comeap.org.uk/introduction-to-air-pollution/117-oxides-of-nitrogen.html>

This report has been approved by the following officers:

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IMPLICATIONS

Financial and Value for Money

1.1 None.

Legal

2.1 None.

Personnel

3.1 None

IT

4.1 None

Equalities Impact

5.1 Poor air quality is known to disproportionately impact the health of the young, older people, those with underlying conditions and the most disadvantaged communities. Addressing air quality will support work to reduce health inequalities.

Health and Safety

6.1 None

Environmental Sustainability

7.1 None

Property and Asset Management

8.1 None

Risk Management and Safeguarding

9.1 None

Corporate objectives and priorities for change

10.1 Work to address air quality could directly and indirectly support corporate objectives including strategies to reduce health inequalities, increase physical activity, air quality management plans, area plan, and transport strategies.

