

Manchester

Public Health Annual Report

2018

A Breath of Fresh Air: Tackling the issue
of poor air quality in Manchester

Foreward



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Wellbeing

Air quality, or rather the lack of it, is a public health issue that has become increasingly prominent over the last few years.

This report is a timely summary of the effects that poor air quality has on both short term and long term health, and what this means for the residents of Manchester.

It's often easy to think of air quality as a national issue, or even an international one – after all, air pollution does not respect political or geographical boundaries. But this would be a mistake. The reality is that we are all partly responsible for air pollution, and can all contribute to making it better.

This report provides an overview of how we can all work together to improve the air that we breathe.

Councils in particular, with their roles in relation to transport, schools, and tobacco control are well placed to implement a variety of solutions with partners that can act to improve air quality. Manchester is already a part of the Greater Manchester Air Quality Action Plan, and is trialling a variety of innovative solutions.

There is cause to be optimistic. Recent measurements show that air quality in Manchester is improving, but there is still a lot of work to be done, and this report sets out some of the actions we can all take.



MANCHESTER
CITY COUNCIL

Introduction

Poor air quality is an issue that Manchester has had to battle before, albeit in a different form. The front cover of this report shows William Wyld's painting of Manchester from Kersal Moor in 1853. It shows a smoky Manchester skyline dotted with the factories that helped power the industrial revolution, and made Manchester the city it is today.

But the painting also represents what the public perception of poor air quality often is; belching chimneys or city skylines blurred with the haze of traffic fumes; scenes more reminiscent in the public imagination of Beijing or downtown Los Angeles than of Manchester today. But while the smoking chimneys and furnaces in Wyld's painting have largely gone, the issue of poor air quality in Manchester has not.

And while the public have an increasing awareness of the detrimental impact of acute air pollution events such as smog, there is little comprehension of the *long-term* impacts of poor air-quality, the importance of indoor air quality, or even the fact that most of the time, polluted air looks and smells, just like air.

This is why this year I have decided to dedicate my annual report to this one issue. Raising local awareness of what modern air pollutants are, how they affect Manchester's population, and what we can do to reduce their production and people's exposure to them is crucial for local engagement to help both meet air quality targets, and to minimize their negative health effects.

I hope that you find this report informative. Only after learning about the risks of poor air quality can we truly start to address how to improve it.

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Manchester Health & Care
Commissioning

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1. The air that I breathe... Why air pollution is important today.

The link between clean air and health is in some ways an instinctive and long-held one. We cough when we inhale irritants - and try to shield our mouths when exposed to smoky environments. In Victorian times fresh sea air was praised for its alleged restorative properties and offered respite from soot-filled cities. More recently the Great Smog of London in 1952 killed up to 12,000 people, harmed 100,000 more, and led to the implementation of the Clean Air Act in 1956 ¹.

This link should not be a surprise; every day an average adult takes 20,000 breaths, and moves approximately 11,000 litres of air in and out of their lungs. Even low concentrations of pollutants can therefore have health impacts over time.



Figure 1: Volume equivalents of 11,000 litres of air. Comparisons are from <http://www.bluebulbprojects.com/measureofthings>

Today the smog and soot of the industrial revolution may have diminished, but they have been replaced with modern pollutants, such as nitric oxides and particulate matter (PM). These may be less visible, but epidemiological evidence on their impact on health is continually growing and evolving, revealing a multitude of effects that are both wide ranging and long lasting. Indeed, this evidence and an increasing number of acute air pollution episodes in several cities, has led Public Health England (PHE) to identify poor air quality as the largest environmental threat to public health in the UK, contributing to 40,000 premature deaths a year ²⁻⁴.

As well as the personal cost to health, the resultant problems can have impacts on hospital admissions ⁵, school attendance ⁶, and business productivity ⁷, meaning that poor air quality is also associated with substantial financial and societal costs.

Indeed, a recent report from PHE estimated that the total NHS and social care cost due to PM_{2.5} and NO₂ was £42.9 million in 2017, and this could rise to £5.3 billion by 2035 ⁸.

Policies to improve air quality will have the potential to alleviate these costs, but they may also generate improvements to health via indirect means, such as through enabling exercise and physical activity, reducing injuries and accidents, and preventing social isolation.

Many people who live in poorer areas are often exposed to higher levels of air pollution ⁹, and may suffer a greater negative impact. Therefore policies to improve air quality will help Manchester reduce health inequalities within the city.

In addition, many of the things we can do to improve air quality will reduce other environmental pollutants, such as carbon dioxide, meaning that tackling air quality is a way of increasing sustainability and addressing the challenge of climate change ¹⁰.

Tackling poor air quality is therefore a way for Manchester to become a healthier place to live, work and visit as well as a fairer, greener, more productive city.



2. In the air tonight... What is air pollution and where does it come from?

Generally any chemical, droplet or particle in the air that is damaging to the health of people, animals or plants can be classified as a pollutant. These may be present outdoors or indoors. There are many air pollutants, but there are several of particular concern for Manchester:

Outdoor

Particulate matter (PM)

Particulate matter (PM) refers to a wide variety of liquids and solids that are suspended in the air and can carry toxic chemicals. PM is defined by its size. PM_{10} refers to particles that are less than 10 microns in diameter (approximately 5 times smaller than a human hair). $PM_{2.5}$ refers to particles at least four times smaller than this (Figure 2). These small sized particles can be inhaled into the deepest parts of the lungs, meaning they have the strongest link to poor health outcomes.

In cities, although vehicle exhausts, particularly diesel, are responsible for the majority of PM, significant amounts of PM are created by construction work, engine and break wear and domestic wood burners.

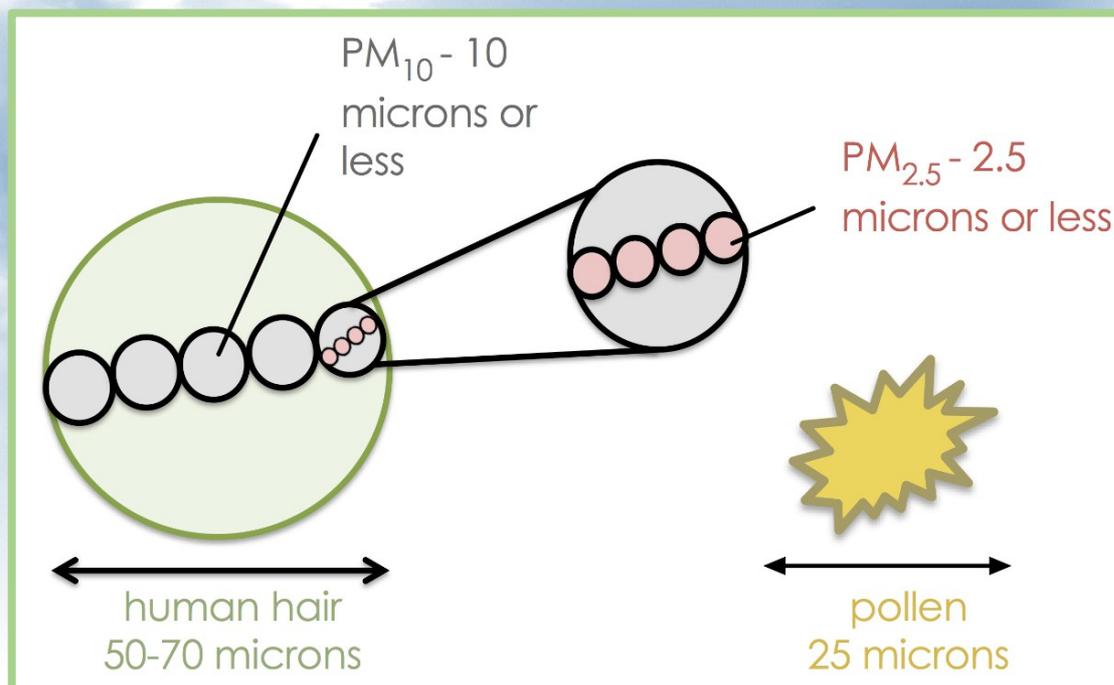


Figure 2: Particulate Matter (PM) Schematic representation of the scale of PM_{10} and $PM_{2.5}$.

Nitrogen Dioxide

Nitrogen dioxide (NO₂) is a gas that is often produced alongside nitric oxide (NO) by combustion processes. Together these are often referred to as oxides of nitrogen (NO_x). NO_x is an important air pollutant because it contributes to the formation of photochemical smog, which can have significant impacts on human health.

In Manchester and the UK in general, 80% of NO_x emissions are due to vehicle emissions, particularly diesel light duty vehicles (cars and vans)¹¹. Numbers of these vehicles have increased significantly over the last ten years¹². Furthermore, the Volkswagen emission scandal has revealed that the emissions of many of these vehicles are higher than first thought.

Indoor

Whilst much attention has been directed towards poor air quality outdoors, we sometimes forget that we spend up to 90% of our time indoors. Consequently, keeping the air which we breathe at home clean is of necessary importance. There are a number of air pollutants that are associated with indoor space, including carbon monoxide, volatile organic solvents and aldehydes. These can be released from boilers or cleaning product¹³. However, one of the most important indoor air pollutants, and one that is particularly relevant for Manchester, is environmental tobacco smoke.

Environmental Tobacco Smoke (ETS)

Environmental tobacco smoke is smoke exhaled by smokers or given off by burning cigarettes, cigars, shisha pipes etc., which is then inhaled by others. The health effects of ETS (sometimes also called second hand smoke) are now well understood and are and legislation has been put in place to control exposure in public places^{14,15}. However, we need to continue to educate people about controlling or reducing exposure to ETS in the domestic environment – particularly with regard to the exposure of children, and pregnant women and the unborn child.



3. Take my breath away...What are the effects on health?

Air pollution can cause a wide variety of health problems in people that are exposed to it. The risk of adverse effects depends on a number of factors, including current health status, pollutant type and concentration, and the length of exposure. Generally, the effects can be categorised as being either short term or long term.

Short-term health effects

In high concentrations both nitric dioxide (NO₂) and particulate matter (PM) can be a direct irritant to mucous membranes around the eyes, nose and airways, and can cause coughing, wheezing, dizziness and nausea^{13,16}.

Various studies have shown associations between poor air quality episodes and hospital admissions for asthma and chronic obstructive pulmonary disease (COPD).¹⁷ Other studies have shown that NO₂ and PM can inhibit lung immunity, leading to increased susceptibility to infections, especially in children. Associations between poor air quality and illnesses such as pneumonia or bronchitis, and acute events such as heart attacks and strokes have also been observed¹⁷.

Long-term health effects

The long term effects of air pollution accumulate throughout a person's lifetime, and can lead to a variety of health complications or even death¹⁶. In England, the Committee on the Medical Effects of Air Pollutants (COMEAP) estimated that NOx and PM_{2.5} contribute to over 40,000 deaths per year^{3,4}. Children are particularly vulnerable to the effects of ETS and exposure increases the risk of cot death, glue ear, asthma and other respiratory disorders, including emphysema later in life.

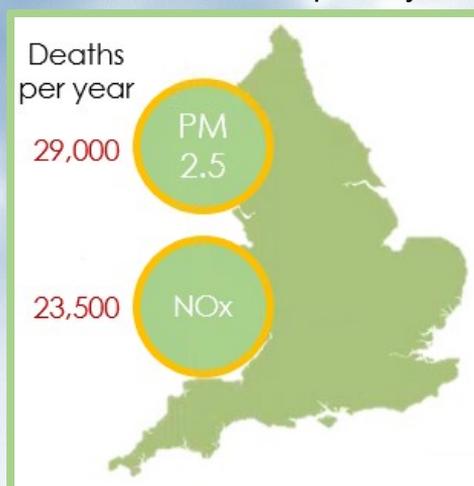


Figure 3: Estimated number of deaths caused by Oxides of Nitrogen (NOx) and Particulate Matter (PM) 2.5. Data are from COMEAP and are for England only. As there is overlap in deaths attributed to each the two pollutants, the deaths accorded to each do not sum, giving an estimated total of 40,000 deaths per year.

In addition to contributing to early death, evidence shows that long term exposure to air pollutants contributes significantly to morbidity, and can cause damage to people's immune systems, nerves, kidneys and other organs^{13,17}. The International Agency for Research on Cancer (IARC – part of World Health Organization (WHO)), listed

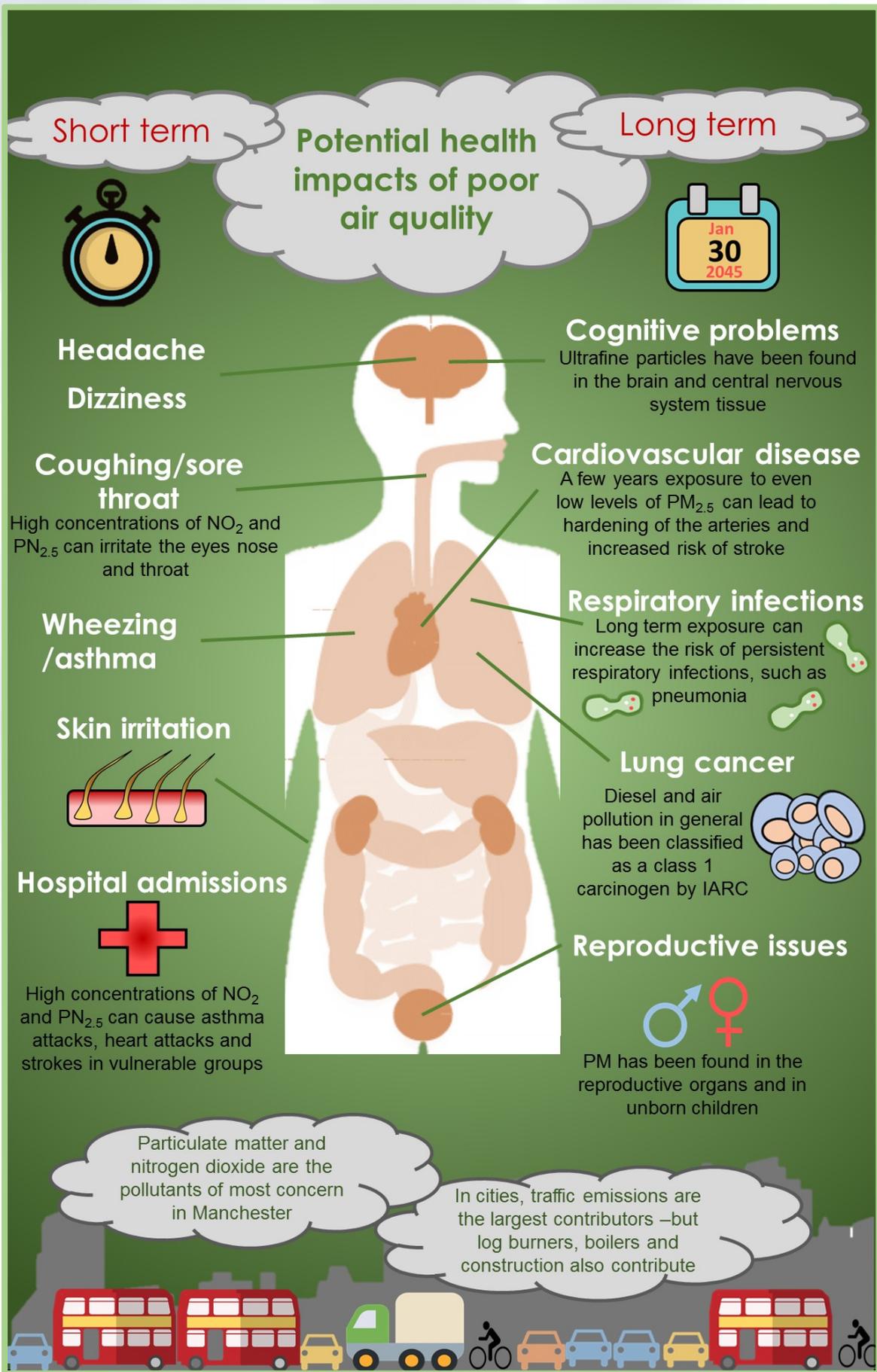


Figure 4: Potential health impacts of poor air quality.

diesel exhaust, and then air pollution generally, as a Group 1 carcinogen, and PM in particular has been associated with increased lung cancer risk^{18,19}. Indeed, WHO estimates that poor air quality is a major contributor to some of the leading causes of death worldwide (20)(Figure 5). In addition, emerging evidence also suggests links with higher rates of still birth and the development of diabetes or obesity.

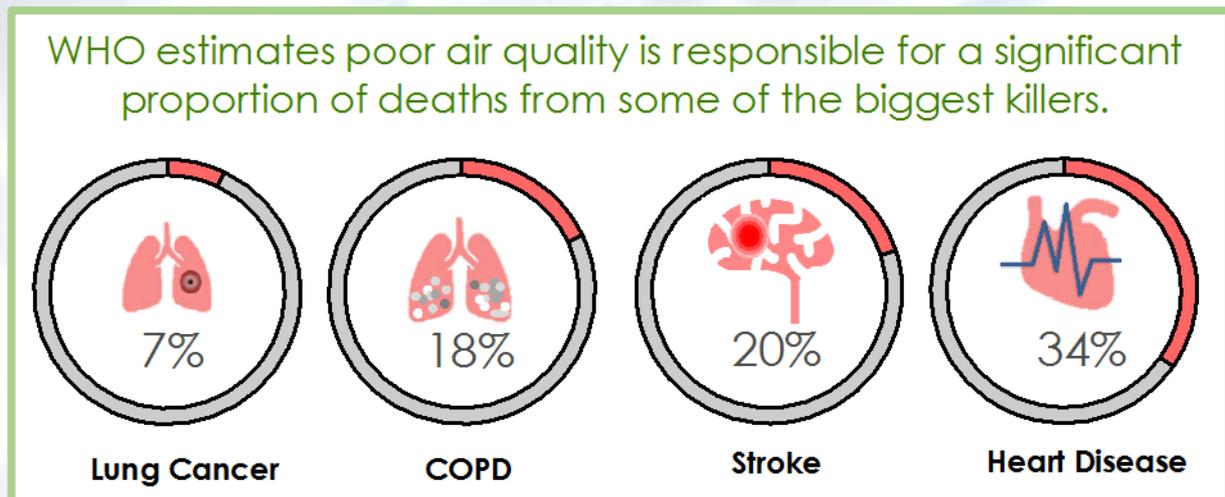


Figure 5: Estimated contribution of poor air quality to deaths from a number of conditions. Data are from WHO BreathLife 2030 website (<http://breathelife2030.org>)

Mental Health

The health impacts of poor air quality are not limited to physical health. Most people can relate to the happy feelings a warm summer day brings. It should therefore be no surprise that air pollution is a major influence of people’s emotions and behaviours. Long-term exposure can result in a variety of psychological problems, such as depression, anxiety and irritability, which can have adverse effects on a wide range of behaviors such as exercising, commuting and socialising. Personal stories collected by the British Lung Foundation (BLF) show the effect that poor air quality can have:

"...air pollution has an effect on my life. It makes my condition so much worse."

"The depressing reality is that when we walk along busy roads to school, my children are breathing in dangerous levels of air pollution"

At risk groups

Air pollution can impact on everyone, but a number of groups are at greater risk. (Figure 6).

Children, from gestation, through infancy and later childhood are particularly vulnerable because of the rapid development of their bodies¹³. Furthermore, children take more breaths than adults, and tend to be more active, which can increase their exposure. As a result, children can be left with lifelong poor health attributable in part to outdoor and indoor pollution exposure.

Some older people can have weaker immune systems and therefore often have lower thresholds for poor air quality.

People who have pre-existing medical conditions, such as asthma, COPD, cardiovascular disease or diabetes are at greater risk. Exposure to air pollutants in these groups can increase the risk of asthma attacks, exacerbations, heart attacks, or strokes, increasing the need for medical attention or hospital admission^{13,17}

People who work outdoors or people who exercise frequently outside may also have increased exposures.

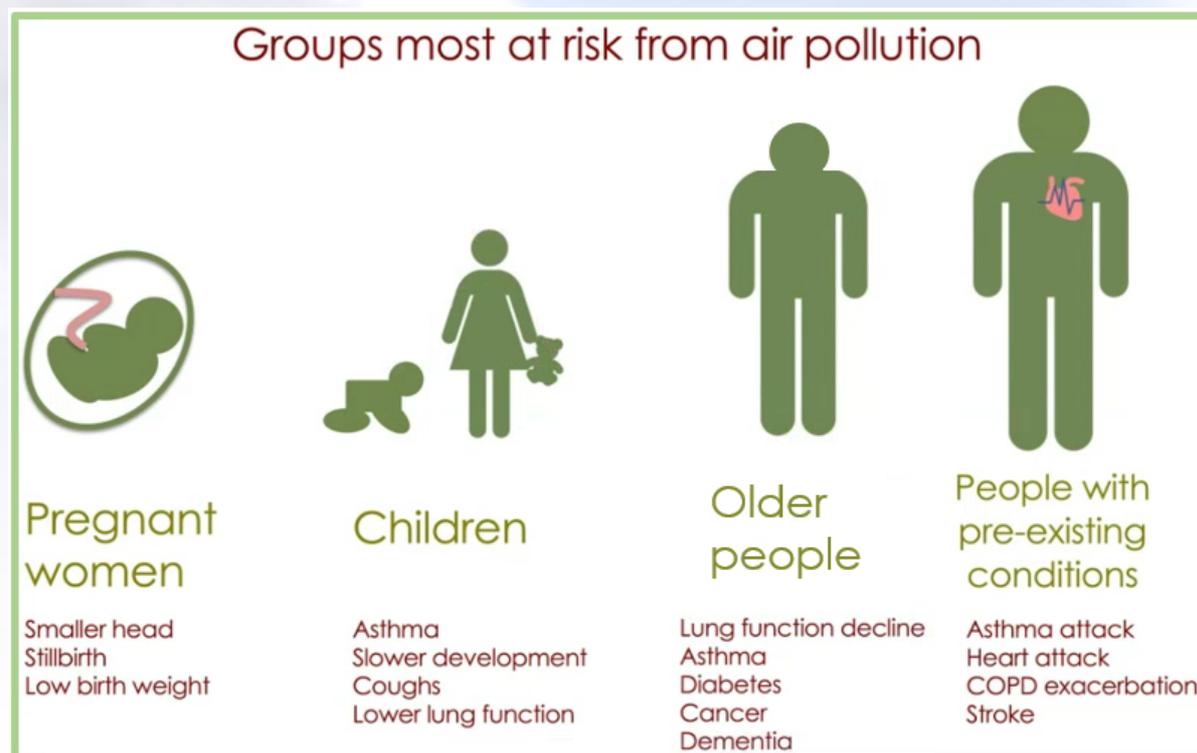


Figure 6: Groups at risk from poor air quality and some of the potential health effects.

4. Clean air is fair air... Inequality and air pollution

It is easy to believe that we all breathe the same air. However, the concentrations of the main air pollutants often diminish quickly as distance from their source increases. Although urban centres like Manchester have poorer air quality than rural locations due to traffic-related emissions, there is still significant local variation.

Studies analysing data at ward level have shown clear inequalities in air pollution⁹, with the greatest exposure falling on communities who often live closest to the busiest roads. Furthermore, some of these same communities have the lowest levels of car ownership, meaning they are more adversely affected compared to more affluent suburban areas (Figure 7).

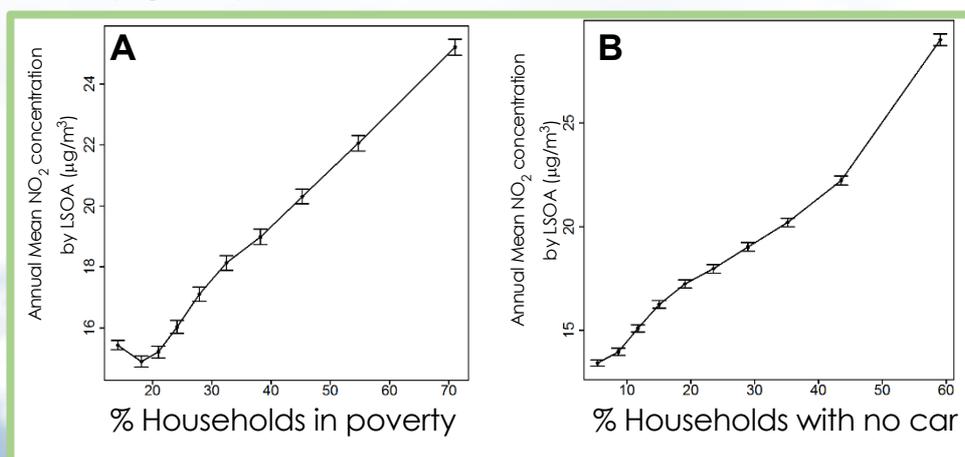


Figure 7: Air quality and deprivation. Relationship between average NO₂ levels and (A) poverty and (B) car ownership, at a lower super output area (LSOA) level. Data are from (9).

In addition to inequalities of exposure, people living in more deprived areas are more likely to have other health conditions as a result of their socio-economic position, which are further exacerbated by poor air quality. As a result, individuals in deprived areas experience more adverse health effects at the same level of exposure compared to those from less deprived areas²¹.

This “double jeopardy” of increased exposure and susceptibility means that poor air quality undoubtedly contributes to health inequalities and will be particularly relevant for Manchester²².

Detailed data are not available for the proportion of Manchester residents that live in deprived areas that are exposed to poor air quality, but there is a strong inequalities argument for tackling air quality. When the evidence clearly shows that it is the poorest and most vulnerable in our society that are suffering most from the effects of air pollution, the only fair air, is clean air.

5. Wind of change... European and national legislation

The health impacts of air pollution underpin European Union (EU) legislation (ambient air quality directive (2008/50/EC), which specifies the legally binding limits for concentrations in outdoor air of major air pollutants, including particulate matter (PM) and nitric dioxide (NO₂) (See table 1). These limits passed into English law through the Air Quality Standards Regulations 2010.

Compliance to these limits is mandatory. Breaches are likely to result in fines which a local authority will have to pay part or all of. Therefore the cost of interventions for improving air quality should be compared not to the *status quo*, but rather situations in which a local authority could be subjected to rolling fines of potentially unlimited amounts.

	Annual Mean	Other exceedance limits
Nitrogen Dioxide	40µg/m ³	1 hour average not to exceed 200µg/m ³ more than 18 times a year
PM 10	40µg/m ³	24 hour average not to exceed 50µg/m ³ more than 35 times a year
PM 2.5	25µg/m ³	N/A

Table 1: Pollutant legal limits (European Union 2016).

Given the health effects, health bodies and organisations needs to play a central role in ensuring health outcomes are appropriately considered in local action and across central Government policies. To this end, in June 2017, the National Institute for Health and Care Excellence (NICE) and Public Health England (PHE) published joint guidelines on outdoor air quality and health.

In addition, laws such as the Public Services Social Value Act 2012 mean that the NHS is under a legal obligation to consider the environmental harm for which it is responsible²⁴.

The Environment Act (1995)²⁵ requires local authorities to review air quality in their area to see if the above standards are being met. Breaches of the limits mean that an Air Quality Management Area (AQMA) should be declared and an Air Quality Action Plan (AQAP) produced, which sets out measures for achieving compliance.

In July 2017, the Department of the Environment and Rural Affairs (DEFRA) published its Air Quality Plan for tackling roadside nitrogen dioxide (NO₂) emissions²⁶. This identified 38 'clean air zones', where NO₂ has been identified as a problem. Manchester (as part of the Greater Manchester urban area) was one of these zones, due to exceeding of the annual mean NO₂ limit value.

Greater Manchester based on current projections will not achieve compliance until at least 2020, therefore substantial action is required.

6. Every breath you take... Air quality and its health and economic impact in Manchester

There are a number of monitoring stations in Manchester, including sites at Piccadilly Gardens and Oxford Road. These show that like many major cities and urban centres, Manchester often suffers from poor air quality. Particulates and nitrogen dioxide levels are of the most concern from a health perspective.

Particulate Matter in Manchester

Particulate matter (both PM₁₀ and PM_{2.5}) are within the legal limits for annual mean limits at both Oxford Road and Piccadilly Gardens (Figure 8). Likewise there have been no exceedances of the 1 hour limit for PM₁₀ at either site in 2017 or 2018. Although this is reassuring, it is important not to be complacent. Levels have not dropped significantly over the last few years and it is worth noting that meeting these limits does not mean that there is no risk to health. WHO set no minimum threshold at which PM is thought to be safe²⁷.

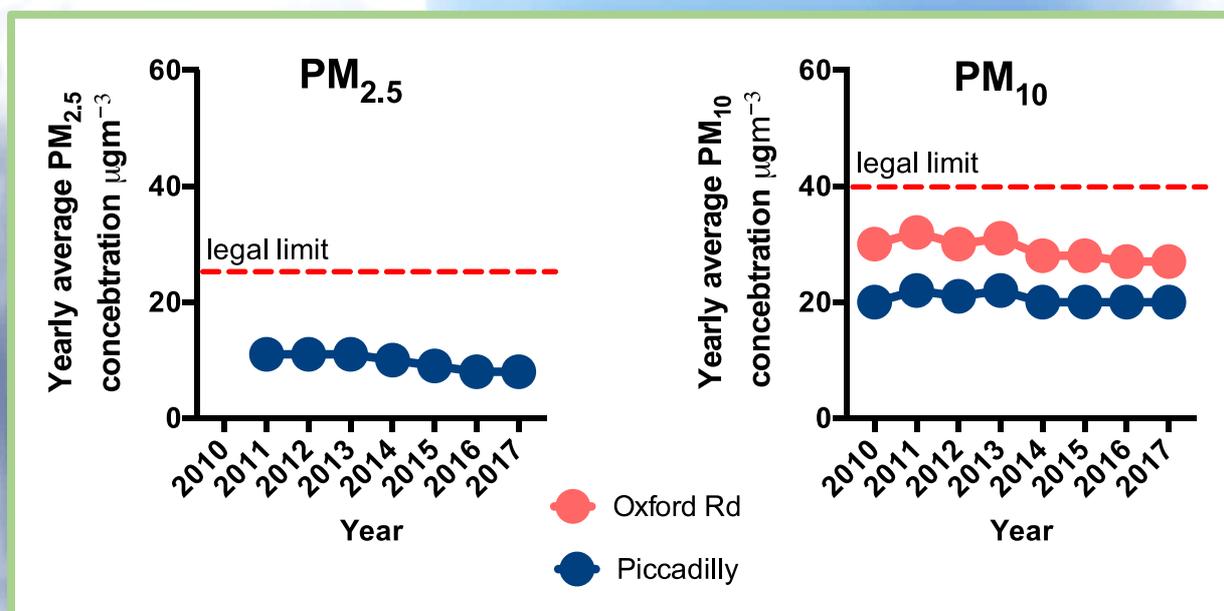


Figure 8: Recorded levels of particulate matter (PM) in Manchester. Data show annual mean levels of PM_{2.5} or PM₁₀, measured at Manchester Piccadilly LA (MAN7) and Manchester Oxford Road (MAN1) sites, 2010-2017. Data are from Air Quality England. PM_{2.5} data are not recorded at Oxford Rd.

Indeed, Public Health England (PHE) still estimated that the fraction of attributable mortality (see box 1) due to fine particulate matter (PM_{2.5}) in Manchester in 2016 was 5.2%. This corresponded to 180 deaths.

Manchester's fraction of attributable mortality is similar to that of England (5.3%) but is joint highest of all the North West Local Authorities (with Liverpool).



Box 1: Stat attack! What is attributable mortality?

Attributable mortality is the number of deaths that would be prevented in a population if the exposure (in this case air pollution) were removed. It can be represented as a number of deaths, or as a fraction (percentage) of total deaths in a particular demographic. It is useful as it gives a number that we can use to compare to other causes of mortality to assess the scale of the problem.

However, in this case the attributable number of deaths can be misleading as air pollution rarely kills people on its own. Rather, it makes existing illness worse. This means poor air quality shortens the life of many more people than the number of deaths in the attributable mortality statistic. Instead, for air quality, it can be more intuitive to think of attributable mortality as a number of deaths at a certain age that is *equivalent* to the estimated harm across a population.

Another way of expressing this would be to say that air pollution in Greater Manchester brings everybody's death forward by 6 months, or brings forward the death of someone with cardiovascular disease by 2 years.

The scale of the problem can be seen when this is represented as deaths per 100,000 persons and compared to other leading causes of premature mortality in Manchester (Figure 9).

Such comparisons show that the attributable death rate for particulate matter in Manchester is greater than the rates from a variety of other causes (such as drug related deaths and communicable disease) which have a much higher profile and dedicated resources to address them.

This figure is only the mortality associated with PM_{2.5}. It doesn't include other pollutants and therefore the overall impact of poor air quality on mortality is likely to be higher.

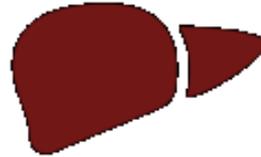
Premature mortality in Manchester

539 per 100,000



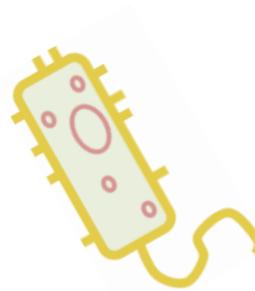
Alcohol related mortality
59.5 per 100,000

Liver disease mortality
28.5 per 100,000



Attributable mortality
due to PM2.5
23.1 per 100,000

Communicable
disease
15.3 per 100,000



Drug related
mortality
8.3 per 100,000

Figure 9: Comparison of causes of premature mortality in Manchester. Data obtained from Public Health Fingertips. Alcohol-related mortality is under 75 rate from 2016 (Indicator 4.01). Liver disease rate is for preventable disease, for under 75, 2014-16 (Indicator 4.06ii). Attributable mortality due to PM per 100,000 was calculated as in (16). Communicable disease is for 2014-16 (Indicator 4.08). Drug related mortality is for 2014-16 (Indicator 2.15iv).

Nitrogen Dioxide in Manchester

Like many other cities, another pollutant of concern for Manchester is nitrogen dioxide. This is actually the only air pollutant for which Manchester is breach of the legal limits. Modelling studies of NO₂ distribution show that it is associated with the arterial roads into Manchester and the city centre (Figure 10).

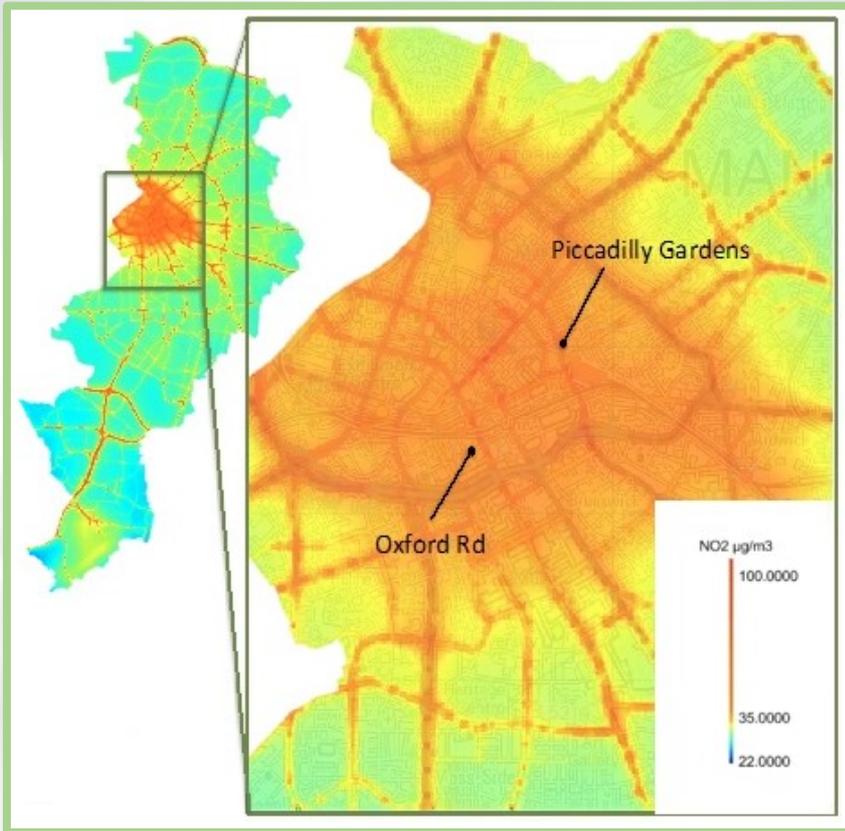


Figure 10: Map of yearly mean NO₂ levels in Manchester LA area and the city centre (enlarged section). Data are from models performed in 2016. Maps were produced by Transport for Greater Manchester (TfGM).

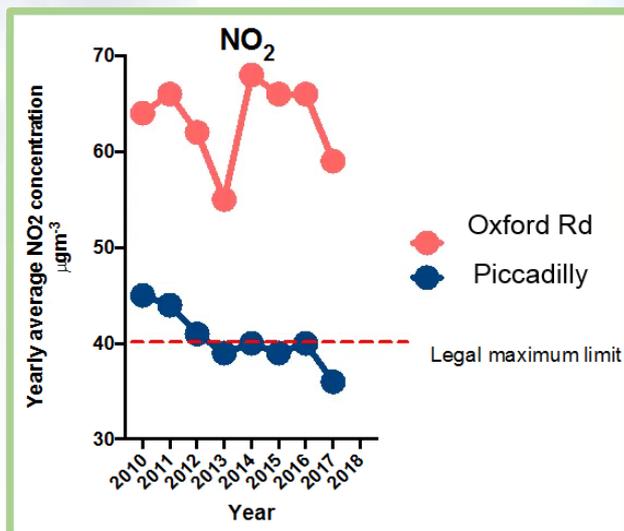


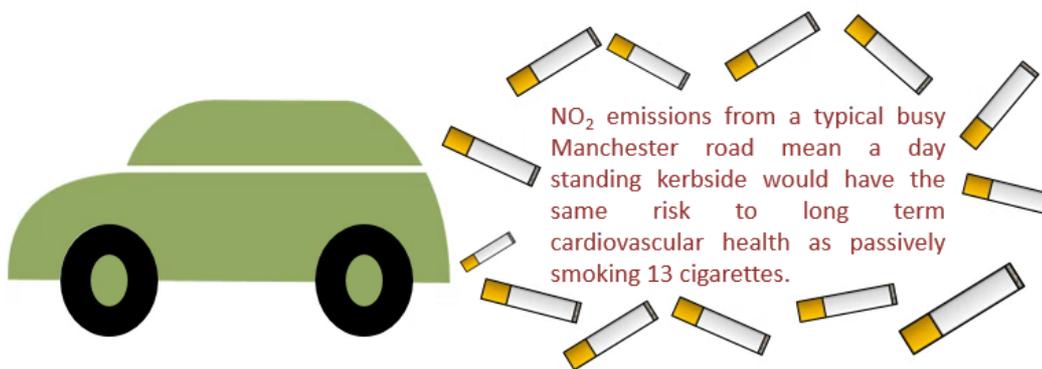
Figure 11: Recorded levels of NO₂ in Manchester. Data show annual mean levels of NO₂ at Manchester Piccadilly (MAN3) and Manchester Oxford Road (MAN1) sites, 2010-2017. Data are from Air Quality England.

Data show that recent concentrations of NO₂ have fallen in both Oxford Road and Manchester Piccadilly over recent years (Figure 11). This reduction has meant that last year, NO₂ levels at Piccadilly were within the legal limit. However, although NO₂ levels at Oxford Road have reduced by 15% between 2014 and 2017, the average mean concentration in 2017 was 59µg/m³, still 47% above the legal limit, and a level that has a potentially large health impact (Box 2). In addition, at the Oxford Road site the 200µg/m³ 24 hour limit was breached 90 times in 2016, but this dropped to 6 exceedances in 2017, and there have been none in the first half of 2018.

Box 2: Communicating the risk: Equating air pollution with smoking

Quite often the health risks associated with air pollution are poorly communicated with the public and policy makers. Terms such as attributable mortality are not well understood. In contrast, the risks associated with smoking are generally well known. For this reason, researchers in the Netherlands developed a method that expresses the health effects of air pollution as an equivalent number of daily passively smoked cigarettes³⁰.

Using this model and applying it to the yearly average NO₂ concentration at busy Manchester Roads illustrates the risks that poor air quality has to some of Manchester's population:



*For the calculation, background levels of NO₂ (obtained from DEFRA) have been subtracted from the recorded values to give an exposure that is due only to local emissions

Environmental Tobacco Smoke (ETS) in Manchester

Most deaths associated with ETS occur in non-smokers who live with a partner or family member who smokes. It is not possible to quantify the number of people in Manchester who are exposed to ETS but it is likely to be a substantial number given Manchester's high smoking prevalence; 21.7% of adults in Manchester smoke (rising to 27.6% for those in manual occupations), compared to 15.5% of adults in England. This is reflected by Manchester also having the highest number of smoking related deaths and second highest smoking attributable hospital admissions. In addition, in relation to pregnancy, 11.6% of mothers are still smoking at the time of delivery²⁸.

Manchester's vulnerable population

Manchester has a relatively young population compared with other cities in England but we know that health and care outcomes among our adult population are poorer than average and that people often have multiple health issues, and these are reflected in some of Manchester's health statistics:

- Manchester has the highest rate of childhood hospital admissions for asthma in England.
- Manchester has the highest under 75 mortality rate for respiratory disease in England.
- Manchester has the fourth highest rate of emergency COPD hospital admissions in England, over twice the national rate.
- Manchester has the highest under 75 mortality rate for cardiovascular disease in England.

It is likely that poor air quality contributes to all of these statistics – indeed there is now evidence that poor air quality is linked to asthma development as well as hospital admissions. Thus the number of people who are at increased risk from poor air quality in Manchester is substantial (Table 2). However, this also means that the benefits of improving air quality will also be substantial.

At risk group	Estimated Number of People
People aged over 65	50,244
Children under 5	46,556
Asthmatic (2016/17)	35,909
COPD (2016/17)	12,198
Coronary Heart Disease (2016/17)	15,006
Maternities (2016/17)	8,284
TOTAL	168,197

Table 2: At risk groups in Manchester. Age numbers are from Office of National Statistics mid-year population estimates 2016. Numbers of people with asthma, COPD or coronary heart disease are taken from GP quality outcomes framework (QOF) data and therefore may not represent prevalence in an epidemiological sense. Number of maternities is the denominator for the Public Health Fingertips breastfeeding initiation indicator (2.02i)

The economic cost to Manchester

Poor air quality does not only come with a cost to health; it is also associated with significant economic and financial costs, both to the healthcare system and the wider economy. A recent report from the Institute for Public Policy Research (IPPR) North showed that the economic cost of PM_{2.5} to Manchester could be over £250 million per year³¹. This rises to over £1 billion per year over the GM area.

7. A breath of fresh air... What are we doing?

Better together – Actions at a Greater Manchester Level

Greater Manchester (GM) is the second most populous urban conurbation in the UK after the Greater London area. Actions taken to improve air quality at this level will have a far bigger impact than if Manchester acted in isolation.

The approved Greater Manchester Low Emissions Strategy/ Air Quality Action Plan (AQAP) was published in 2016¹¹. It is structured around 3 broad themes: Reducing Traffic (by encouraging alternative travel modes); Increasing Efficiency (by making the most appropriate use of roads and vehicles for different tasks); and, Improving Vehicles (by encouraging less polluting vehicles to be used).

Although acting across the whole GM area, there have been a number of interventions that have impacted specifically in Manchester to improve air quality.

Going Dutch On Oxford Rd

Oxford Rd is a major arterial route into Manchester. A recent redevelopment was done to favour public transport and make it a lot more pedestrian and cycle friendly. As well as wider pavements, Dutch style cycle lanes have been installed which run either side of the road as well as behind each bus stop.

Transport for Greater Manchester (TfGM) have also worked with bus companies to improve the emission standards of vehicles using Oxford road.

Air quality along Oxford Rd has improved as a result.

There is now potential to extend the scheme through the ward of Chorlton.



Saying no to NO: Improving School Buses

Using monies from the Department for Transport Technology Fund, recently 41 diesel buses from TfGM's fleet of Yellow School buses were retro-fitted with cutting edge pollution control technology.

Tests showed the intervention reduced nitrogen oxides (NOX) emissions by 99%, delivering significant environmental benefits and reducing children's exposure to harmful air pollutants.

It was so successful it won a National Clean Air Award for Local Authority Air Quality Initiative of the year!



The Mayor of Greater Manchester has recently made sustainability and air quality a leading priority for the region. Alongside other initiatives, the idea of a Clean Air Zone (CAZ) is being considered.

Local actions

As well as the initiatives that are taking place at a GM level, Manchester is also taking action at a city level. The actions fit well with the principles of the Our Manchester strategy (2016-25), which includes strong commitments to improve air quality and achieve environmental sustainability.



The City Council has established an Air Quality Steering Group with representation from Manchester Health and Care Commissioning, including the Population Health and Wellbeing Team. The Air Quality Steering Group are currently coordinating work to identify Manchester schools within the Air Quality Management Area and explore mitigation measures, including green screening, to reduce exposure to pollutants.

Actions to address climate change also help to address air quality. The City Council is a partner in the “Manchester: A certain future” strategy, which aims to reduce CO₂ levels by 41% by 2020, and for Manchester to become carbon neutral by 2050. Similarly the Council’s ‘Green and Blue Infrastructure Strategy’ will help improve air quality while allowing residents to make the most of Manchester’s parks, river valleys and canals.

Action is also being taken at a community level. By taking a local perspective and linking air pollution to specific locations such as busy roads, junctions or schools, then it becomes possible to discuss interventions to improve air quality at these locations. This helps shift the view that air pollution is something that can only be solved with larger systemic changes and allows residents, local councillors and others to take more ownership of the issue. Such an approach has successfully been used in Hulme, which has identified air pollution as an issue of local importance, and have launched its own action plan on how to help improve air quality (Case study 1).

This type of approach has two main advantages. Firstly, residents are more likely to be engaged and thus change their behavior if they have been part of decisions made about interventions. Secondly, communities that better understand air pollution can often become powerful advocates for action and improvement in their local area.

Case Study 1: Nature of Hulme

Situated just South of the city centre, Hulme has a population of approximately 20,000 people. Bordered to the North by Stretford Rd and to the East by Princess Rd, and in close proximity to Mancunian Way, parts of Hulme lie in Manchester's Air Quality Management Area (AQMA). Therefore improving air quality is an agreed local priority.

Hulme has a history of environmental activity led by residents, Councillors who support and lead environmental improvement through community based approaches and organisations who want to support this way of working.

In 2017, the Hulme Neighbourhood Team in Manchester City Council commissioned West Country Rivers Trust to start a programme called Nature of Hulme.

The programme has two strands of activity:

1. To map and analyse green spaces, existing environmental issues and recent environmental research in Hulme and develop a toolkit which demonstrates the impact of interventions.



2. To run a series of community engagement activities with people who live, work, study and play in Hulme. This was to gain their perspective of the environment and how it could be improved. This was carried out through community workshops, drop in sessions, and work in schools and online surveys

From this, a vision to improve the Nature of Hulme for this generation and beyond is currently being developed. This vision will inform an annual action plan made up of collective and individual actions. Some of the actions will be quick while others will take longer to reach fruition.

Through the community engagement and mapping work, air quality issues were identified, alongside other issues that contribute to air quality problems (such as school drop offs and lack of cycling infrastructure).



A number of activities that people, groups and organisations are interested in doing, or have already started, include:

1. Road safety drama workshops followed up by enforcement and information days, to encourage parents to try alternative transport options for school pick up and drop off.



2. Citizen science activity, for example installing air quality tubes, which act as a catalyst for community activity for improving air quality (for example, tree planting).



3. Wildflower, tree planting, street planters and green bus shelters.

4. School-based environmental work with students such as anti-idling, planting and greening achieved through the application of Neighbourhood Investment Fund (NIF) grants alongside environmental awareness work.

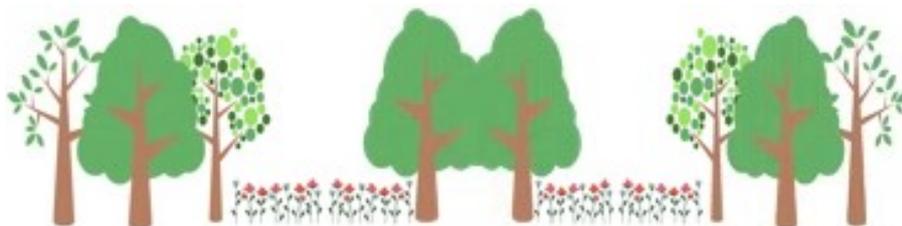


5. Community wardens, where residents lead their own environmental and street improvements.



6. Improvements to pedestrian routes and road crossings to create safe walking routes.

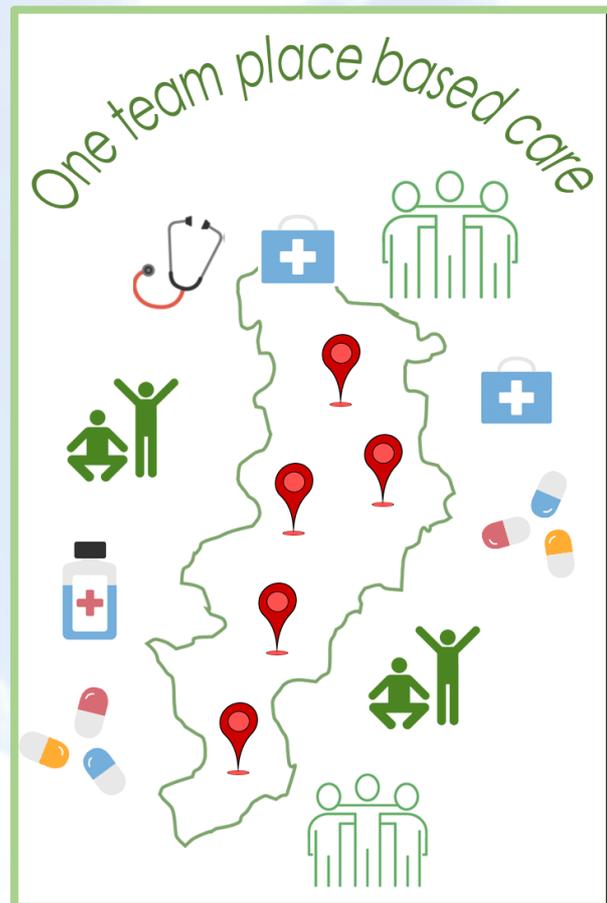
7. Strengthen connections between Manchester City Council, the Universities, developers and residents to collaboratively work to find achievable solutions to issues and develop sustainable future plans



Recently the report of the Chief Medical Officer²⁹ emphasized the important contribution that the health system itself can make in improving air quality. The NHS (both practically and symbolically) has a special role in not only curing disease but also in prevention. This can extend to the NHS's environmental footprint and in particular its impact on air quality. The NHS is now responsible for almost one in 20 of all vehicles on the road, made up of patient and staff travel and its own fleet of vehicles. This will be reduced if staff can be incentivised to travel to work differently, if the right care is provided in the right place, and by implementing models of care that involve the least amount of travel. All these things are now happening in Manchester (case study 2).

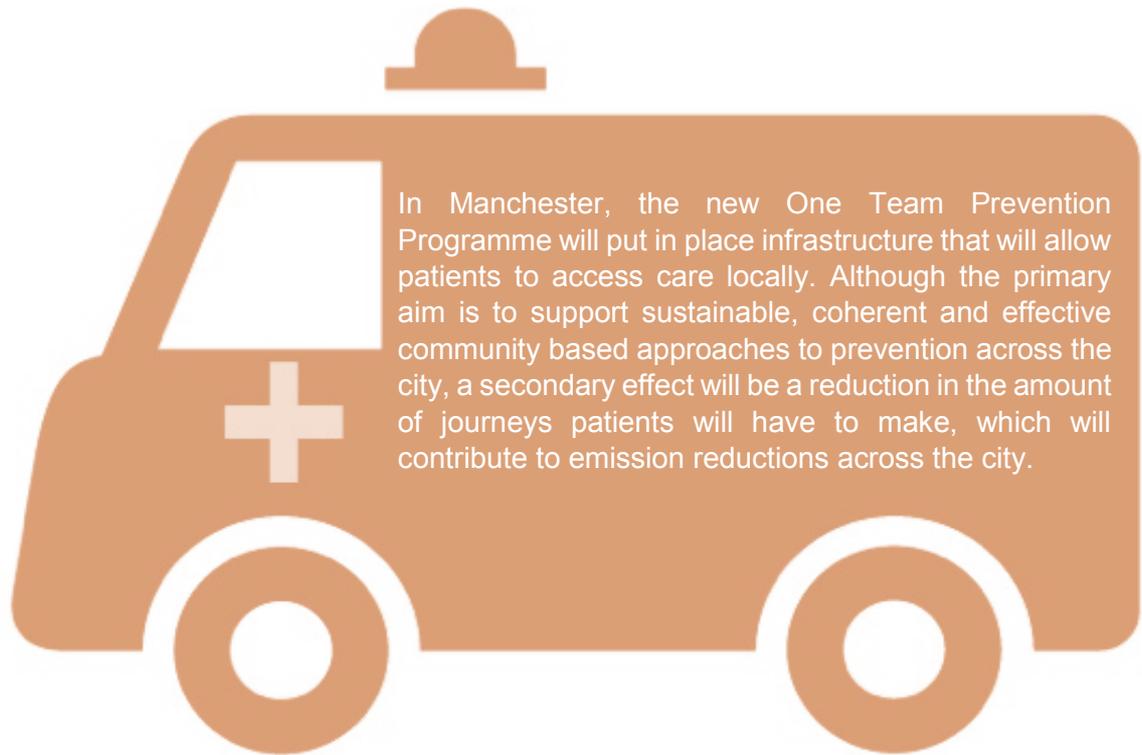
Manchester's new Prevention Programme aims to take a person and community-centred, asset-based, approach to delivering care and improving health outcomes for residents in the twelve Manchester neighbourhoods.

Neighbourhood Health and Wellbeing Development programmes and local Health Development Coordinators will enable residents to identify and address the issues impacting on their health and wellbeing, including air pollution. The programme will also provide a key opportunity for public engagement and education around the issue of air quality using an 'every contact counts' philosophy. The services will work closely with other wellbeing services in the city such as Buzz, and the Be Well social prescribing service to support individuals to change lifestyles and behaviours, including physical activity and smoking cessation.



In tackling indoor pollution, the development of the Manchester Tobacco Control Plan provides an opportunity for a range of different agencies across the city to work together to address the health impacts of Environmental Tobacco Smoke. This includes supporting the work on smoke-free policies across Greater Manchester, rolling out smoke free outdoor spaces, smoke free homes, and continuing to work with the trading standards and public protection teams at the City Council. This helps to ensure that any breaches or misunderstandings about the application of the Health Act 2006 are dealt with on an ongoing basis and that all tobacco-related legislation is enforced. Indeed, the Manchester Population Health and Wellbeing team, working with other colleagues at the council, recently ran a successful intervention that targeted Shisha cafes in the city (case study 3).

Case study 2: Leading by example – How health services in Manchester can make a difference.



In Manchester, the new One Team Prevention Programme will put in place infrastructure that will allow patients to access care locally. Although the primary aim is to support sustainable, coherent and effective community based approaches to prevention across the city, a secondary effect will be a reduction in the amount of journeys patients will have to make, which will contribute to emission reductions across the city.



MFT travel plan achievements

- 4.3% decrease in single-occupancy car travel
- 0.7% increase in bus travel
- 5% increase in active travel

It's not just patient care that can make a difference. Various health organisations in Manchester employ thousands of people. Manchester University NHS Foundation Trust (MFT) introduced a travel plan in 2015. This included initiatives such as travel discounts (for First and Stagecoach buses), interest free loans and improving cycling facilities. With the three Manchester CCGs recently joining together with Manchester City Council to form

Manchester Health and Care Commissioning (MHCC), there is a great opportunity to build on this and promote a scheme across the city.

Case study 3: Tackling Shisha in Manchester

Some areas of the city have a high number of Shisha (or Hookah as it is commonly known) bars. These are legal but are bound by the 2007 smoking ban and can only operate in areas with three sides open for ventilation.

Nonetheless, the risks of inhaling shisha smoke, either directly or passively are much higher than people think. The filtration through the water doesn't filter out the harmful tobacco smoke and the exotic flavours mask the tobacco taste and make it easier to smoke shisha for longer periods at a time.

In fact, an average shisha session can last about one hour and can be as damaging to health as smoking 100 cigarettes. It also produces high levels of environmental tobacco smoke that negatively impacts air quality.

Manchester City Council launched a campaign to raise awareness of the dangers and legality of smoking shisha to tackle these common misconceptions surrounding it.

Population health postcards warning of the health risks as well as the legality of smoking shisha were distributed to all the cafes and their customers.

A multi-agency team, led by Manchester City Council's Licensing and Out of Hours Compliance Team, visited shisha cafes to deliver this health message and to ensure that cafes and customers were complying with the legislation.



8. Making a difference...What can we all do?

It may feel as though air quality is too big an issue to tackle on an individual scale. However there are many things we can all do that can reduce the amount of air pollution we generate or are exposed to. Small actions all add up and can make a real difference over time.

Reducing our emissions

Drive less – The best thing we can do, where we are able to, is reduce our reliance on cars. The best choice would be to walk or cycle so we get the benefits of exercise, but using public transport such as buses or the Metrolink can also contribute to emission reductions. If we need to drive, then we should try and time our journey to avoid peak times – congestion significantly increases the total amount of emissions.

Don't idle. Idling a car for 10 minutes uses the same amount of fuel as driving for a mile – but the emissions all end up in the same place. The effect is made worse if multiple vehicles are idling at the same time. This occurs at taxi ranks or at the school gates. The latter is of particular concern because we know that children are particularly susceptible to the effects of air pollution. Cutting idling could reduce emissions by as much as 20-30% in the worst affected areas.



Make sure tyre pressures are correct. Tyres only 15psi (1 bar) away from the correct pressure can increase fuel consumption by 6%, with a subsequent increase in emissions. Checking tyre pressure regularly will help cut emissions, and will also save you money.

Reduce the use of wood and coal - or switch to a cleaner burning modern wood stove, and burning quality wood or smokeless fuels on open fires instead of wet/green wood or house coal will reduce emissions and exposure to particulate matter.

Reducing our exposure

Drive less. Exposure to air pollution inside vehicles can be as high as or higher than outside, particularly if sat in traffic. Thus, if we are able to do so, choosing an alternative to the car reduces our exposure, as well as our emissions. If we need to drive, put the car's air conditioning system onto recycle when sat in traffic.

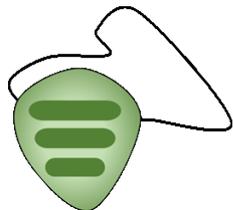
Try and choose routes that avoid the busiest roads - Pollution levels can fall by a factor of 10 just by moving a few metres away from the main source of the pollution. Even walking on the side of the pavement furthest away from the road or standing back from the kerb when waiting for the lights to change can reduce our exposure. When using the bus, research shows that sitting on the opposite side to the driver (or upstairs on a double decker) can decrease our exposure by 10%.

Be aware of local air quality -Vulnerable individuals can also take steps to be aware of air quality episodes and manage symptoms in consultation with their GP.

Don't forget indoors - We need to protect ourselves indoors too. Opening windows or smoking outside can help reduce exposure to environmental tobacco smoke.

Myth busting!

I'd better not walk or go outside then! Although it is a major public health threat, air pollution can't be viewed in isolation to other public health issues. The health impacts of sedentary lifestyles and obesity are also great. The benefits of active travel and exercise are far larger than the risks from air pollution for most people, most of the time. People should walk and cycle when they are able to, and children can play outside.



Should I wear a mask? The evidence for the effectiveness of masks is mixed. Some expensive ones with activated charcoal can filter NO₂, but even these can't filter out ultrafine particulate matter. Even if there is a small gap around the mouth, any benefit gained will likely be lost.

Poor air quality is a price we need to pay for economic growth. Studies have shown that poor air quality has an economic cost. Tackling air pollution can be a key element of growth and regeneration policies, and city centres can benefit in many different ways from measures that reduce air pollution and increase their appeal as places to visit or do business.



9. Recommendations and conclusion

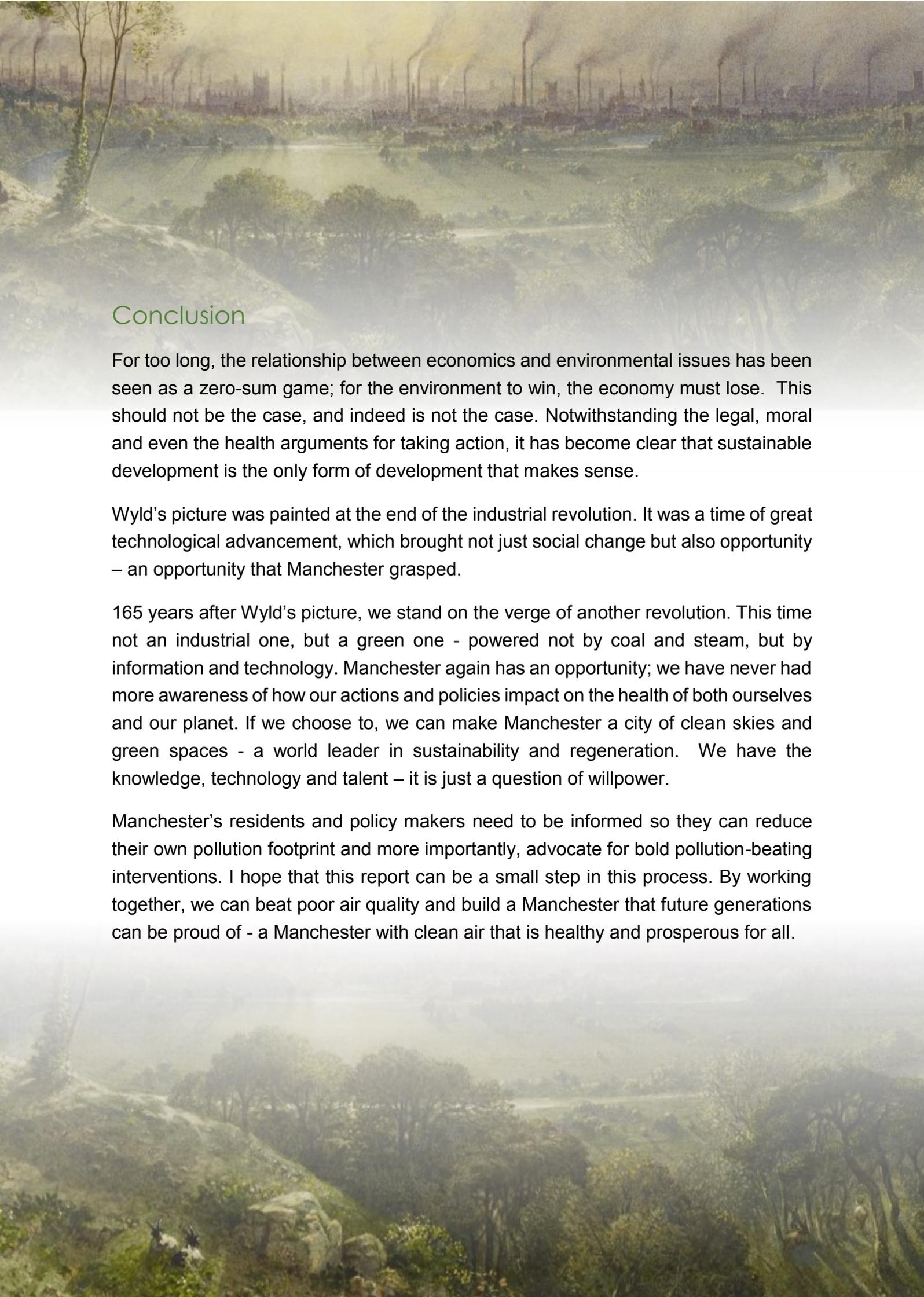
Recommendations

In this report we have seen how the quality of Manchester's air has a number of short and long term health effects that also come with financial and economic cost. Furthermore, it is the poorest and most vulnerable, including our children that shoulder the greatest burden.

Based on this report I have listed below a series of recommendations to be considered over the next year that will contribute to our ongoing efforts to reduce the negative impacts of poor air quality on health.

We call on:

- 1.** Health and social care partners to further develop and implement policies for Active Travel to enable shifts to healthier modes of travel for staff, patients and users of services.
- 2.** NHS organisations working with Public Health England to actively promote clean air campaigns and positive public health messages on cycling and walking.
- 3.** Wellbeing services in Manchester to incorporate key messages on reducing air pollution into 'making every contact count' when providing 1 to 1 lifestyle advice to residents.
- 4.** Systems to be developed to help GPs and primary care staff provide bespoke advice to patients with Chronic Obstructive Pulmonary Disease (COPD) and asthma on how to manage their conditions when air quality is poor (e.g. text alerts).
- 5.** The Manchester Healthy Schools Programme and the School Health Service to work with schools on education programmes that raise awareness about the risks of poor air quality and how to reduce the negative health impacts on children and young people.
- 6.** The City Council to lead work in taking forward recommendations from Greater Manchester Making Smoking History Programme in relation to smoke free spaces, which has the support of 80% of residents across Greater Manchester.

The background of the page is a painting of a landscape. In the foreground, there are rolling green hills with a river winding through them. In the background, a large industrial complex with many tall chimneys is visible, emitting smoke. The overall scene is a mix of nature and industry.

Conclusion

For too long, the relationship between economics and environmental issues has been seen as a zero-sum game; for the environment to win, the economy must lose. This should not be the case, and indeed is not the case. Notwithstanding the legal, moral and even the health arguments for taking action, it has become clear that sustainable development is the only form of development that makes sense.

Wyld's picture was painted at the end of the industrial revolution. It was a time of great technological advancement, which brought not just social change but also opportunity – an opportunity that Manchester grasped.

165 years after Wyld's picture, we stand on the verge of another revolution. This time not an industrial one, but a green one - powered not by coal and steam, but by information and technology. Manchester again has an opportunity; we have never had more awareness of how our actions and policies impact on the health of both ourselves and our planet. If we choose to, we can make Manchester a city of clean skies and green spaces - a world leader in sustainability and regeneration. We have the knowledge, technology and talent – it is just a question of willpower.

Manchester's residents and policy makers need to be informed so they can reduce their own pollution footprint and more importantly, advocate for bold pollution-beating interventions. I hope that this report can be a small step in this process. By working together, we can beat poor air quality and build a Manchester that future generations can be proud of - a Manchester with clean air that is healthy and prosperous for all.

10. So you want to know more?....

There is a wealth of information that is now available on the topic of air quality, its impacts on health, and the best ways to beat it. It's not been possible to fit it all in this report. Here's some other sources of information that you may find useful:

- In 2016 the Royal College of Physicians published a report "Every breath we take: the lifelong impact of air pollution". It gives a comprehensive overview of the scale and breadth of the harm to health caused by air pollution, including indoor air pollution. <https://www.rcplondon.ac.uk/projects/outputs/every-breath-we-take-lifelong-impact-air-pollution>
- WHO's Breathlife 2030 website features a range of information on air quality, including resources for individuals, health professionals and cities. <http://breathelife2030.org/>
- The Chief Medical Officers (CMO's) 2017 report focused on the health effects of pollution in general, but contained sections on air quality. It made a series of recommendations on how air pollution can be reduced. <https://www.gov.uk/government/publications/chief-medical-officer-annual-report-2017-health-impacts-of-all-pollution-what-do-we-know>
- The Greater Manchester Air Quality Action Plan details the actions that are being taken at a local level to improve air quality. <https://www.greatermanchester-ca.gov.uk/downloads/download/78/gm-air-quality-action-plan-2016-21>
- Manchester City Council has a Joint Strategic Needs Assessment (JSNA) topic paper on air quality. This outlines the health impact in Manchester and details local policies and strategies, including the role of the population health team. <http://www.manchester.gov.uk/downloads/download/6808/adults-and-older-peoples-jsna-air-quality>
- You can keep up to date about the air quality in your area by using the UK AIR website, which is hosted by the Department for the Environment and Rural Affairs (DEFRA). <https://uk-air.defra.gov.uk/>

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