



GIG
CYMRU
NHS
WALES

Iechyd Cyhoeddus
Cymru
Public Health
Wales



Llywodraeth Cymru
Welsh Government

Working together to reduce outdoor air pollution, risks and inequalities

Guidance to support policy and practice
development across the NHS in Wales

Contents

Foreword	2
1. Air pollution, sources and health effects	3
1.1 Air pollution and health	3
1.2 Pollution sources	4
2. Scoping air pollution problems in Wales	5
2.1 Air pollution concentrations in Wales	5
2.2 Vulnerable populations groups and inequalities	6
3. Air quality management in context	8
4. What you can do to help	11
4.1 Working to key principles	11
4.2 Objectives and specific actions	13
5. Connecting policy and practice	19
6. Communicating important messages	21
6.1 Communications to the public around long-term air pollution exposure	21
6.2 Communications around short-term air pollution exposure	22
7. Capturing feedback	24
8. Evidence links and other useful resources	24

Author

Huw Brunt: Lead Consultant, Environmental Public Health, Public Health Wales
in conjunction with Welsh Government Departments for Health and Social Services and
Environment and Rural Affairs

April 2018

Foreword

The Welsh Government and Public Health Wales are committed to improving outdoor air quality in Wales, but it is clear we face significant challenges in doing so. NHS Wales has a vital role to play and this guidance demonstrates how NHS policy and practice can support collective air quality management efforts across Wales. The guidance complements existing responsibilities and seeks to encourage different ways of working and actions to reduce air pollution. Four important principles are identified to help to support, influence, communicate and champion air quality improvement within and beyond the NHS. The guidance supports our commitment in our national strategy, *Prosperity for All*, to build healthier communities and better environments by reducing emissions and delivering vital improvements in our air quality. It also highlights how this work relates directly to the principles and requirements of the Well-being of Future Generations (Wales) Act 2015.

Alongside this guidance, the Welsh Government and Public Health Wales will continue to demonstrate the importance attached to improving air quality by undertaking a focused programme of work and research. This includes the recent publication of new Welsh Government air quality policy guidance which recognises schools and active travel routes as key locations for action, along with other places including hospitals, care homes, nurseries and sports grounds. The guidance also explains that older people, those with chronic illnesses, children, and people undertaking prolonged physical activity all deserve the same level of protection wherever they may be. With a focus on protecting the health of our future generations, special consideration is encouraged in relation to the long term risks to children posed by air pollution. The new policy guidance therefore requires local authorities to take a risk-based approach to air pollution assessment and management and, working with the support of other public bodies (including the NHS) and the public, complement targeted local intervention with universal action that seeks to reduce air pollution and the associated risks for all in Wales.

NHS Wales has an important contribution to make to reduce air pollution impacts. To support this approach, a programme of work has been set out by Welsh Government. This includes the provision of a range of information materials that can help inform staff and the public about risks associated with poor air quality and what steps they can take to alleviate the problem. The air we breathe is an important every day necessity that we may take for granted. Air quality management is a key public health priority which we must all recognise. Integrated action to improve air quality needs to be taken locally, regionally, nationally and internationally. Together, we must all recognise this need and take action, individually and collectively, at work and during our every-day lives.

This guidance intends to support NHS Wales to make a valuable contribution to collective efforts to reduce air pollution, risks and health inequalities across Wales.

We look forward to working with you.

Vaughan Gething AM **Cabinet Secretary for Health and Social Services**

Hannah Blythyn AM **Minister for Environment**

Dr Tracey Cooper **Chief Executive Public Health Wales**

1. Air pollutants, sources and health effects

1.1. Air pollution and health

Outdoor air pollution is a significant environmental determinant of health¹. Exposure can adversely affect health, particularly amongst vulnerable population groups. The pollutants of most widespread concern in the context of air quality management are particulate matter (PM) and nitrogen dioxide (NO₂), but as air pollution is a complex mixture of gases, other pollutants may also affect health²:

- **Particulate matter (PM₁₀, PM_{2.5})**

Particulate matter is a term that refers to tiny particles of varying chemical composition less than 2.5µm (PM_{2.5}) or 10µm (PM₁₀) in diameter. When inhaled, particles less than 10µm in diameter (the PM₁₀ 'thoracic' fraction) can penetrate, and get deposited in, the human upper respiratory tract; particles less than 2.5µm in diameter (the fine PM_{2.5} 'respirable' fraction) can penetrate deep into the alveoli of the lungs. Both have the same biological mechanism which causes the lining of the lungs to become inflamed. Through a process of oxidative stress, this places pressure on, and compromises the function of, various body systems. Short-term exposure can result in eye, nose and throat irritation, asthma symptom exacerbation, headaches and nausea. Long-term exposure increases morbidity and mortality risks from heart disease and strokes, respiratory diseases, lung cancer and other effects³.

Particulate matter from road transport sources comprises primary particles emitted directly to atmosphere from combustion sources, tyre and brake wear, and secondary particles formed by chemical reactions in the air.

- **Nitrogen dioxide, sulphur dioxide and ozone**

These gases irritate the airways of the lungs, increasing symptoms of those suffering from lung diseases. Short-term exposure to nitrogen dioxide is associated with increased cardiovascular and respiratory morbidity. All combustion processes in air produce oxides of nitrogen (NO_x) that include nitrogen dioxide; and all combustion process of fuels containing sulphur produce sulphur dioxide. Non-methane volatile organic compounds emitted from combustion of fuels such as petrol can react with other atmospheric pollutants, primarily NO_x, to produce ozone.

In the UK each year, it is estimated that the equivalent of 29,000 deaths^{4,5} are attributed to long-term exposure to fine particulate matter (PM_{2.5}) air pollution, and the equivalent of 23,500 deaths⁶ are attributed to long-term nitrogen dioxide (NO₂) exposure. Accounting for the potential overlapping health effects

¹ World Health Organization (2015). Economic cost of the health impact of air pollution in Europe: Clean air, health and wealth. WHO: Copenhagen, Denmark.

² http://www.euro.who.int/_data/assets/pdf_file/0006/298482/Health-risk-assessment-air-pollution-General-principles-en.pdf?ua=1

³ World Health Organization (2013). Review of evidence on health aspects of air pollution—REVIHAAP. WHO: Copenhagen, Denmark.

⁴ Gowers, A.M., Miller, B.G., Stedman, JR (2014). Estimating Local Mortality Burdens Associated with Particulate Air Pollution. Public Health England: London, UK.

⁵ COMEAP (2010). The Mortality Effects of Long-Term Exposure to Particulate Air Pollution in the United Kingdom. COMEAP.

⁶ Defra (2015). Draft Plans to Improve Air Quality in the UK: Tackling Nitrogen Dioxide in Our Towns and Cities. UK Overview Document. Defra: London, UK.

of PM and NO₂ (believed to be around 30%), it is estimated that the equivalent of 40,000 deaths occur annually in the UK as a result of exposure to outdoor pollution⁷. On average, exposure reduces the life expectancy of every person in the UK by 7 to 8 months⁸. The societal cost of air pollution (accounting for health service costs and reduced productivity through lost work-days) in the UK is significant, standing at around £20b every year⁹.

1.2 Pollution sources

The principal source of particulate matter and nitrogen dioxide affecting people is road transport emissions, but other transport sources as well as industrial, agricultural, domestic and natural sources also contribute (Fig.1).



Fig.1. Principal sources of outdoor air pollution

(source: Defra, http://www.local.gov.uk/sites/default/files/documents/6.3091_DEFRA_AirQualityGuide_9web_0.pdf)

Pollutants may not only cause problems locally in the immediate vicinity of sources; if suspended in air they can travel long distances and affect more people over wider geographical areas. This calls for action at international, national, regional and local levels.

⁷ Royal Colleges of Physicians and Paediatrics Child Health (2016). *Every breath we take – the lifelong impact of air pollution*. London: Royal College of Physicians.

⁸ Defra (2007). *The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (volume 1)*. Defra: London, UK.

⁹ Royal Colleges of Physicians and Paediatrics Child Health (2016). *Every breath we take – the lifelong impact of air pollution*. London: Royal College of Physicians.

2. Scoping air pollution problems in Wales

2.1 Air pollution concentrations in Wales

Like the rest of the UK, general air quality in Wales has improved over past decades, but problems persist. Wales' annual mean concentrations of NO₂ and PM₁₀ pollutants have gradually fallen since the early 1990s but now show signs of plateauing (Fig.2). Annual mean concentrations of PM_{2.5} also remain relatively stable. More air quality data are available at: <http://www.welshairquality.co.uk/>

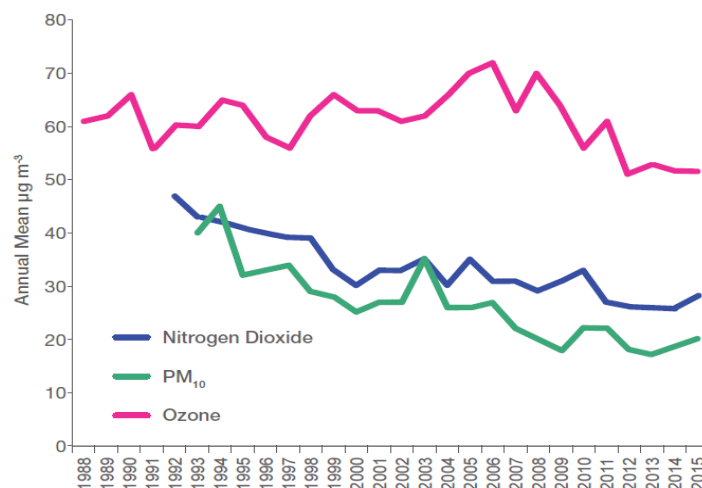


Fig. 2. Annual mean concentrations of nitrogen dioxide, particulate matter and ozone ($\mu\text{g}/\text{m}^3$), Wales (source: Welsh Air Quality Forum)

Despite these all-Wales annual mean concentrations being relatively low compared with some other parts of the UK, Public Health Wales estimates that the equivalent of around 1,600 deaths are still attributed to PM_{2.5} exposure, and around 1,100 deaths to NO₂ exposure, each year in Wales (based on analyses of 2011/12 data).

Care should be taken when interpreting and communicating these statistics due to uncertainties in the coefficients used to derive them. Impact estimates do not refer to 'actual' numbers of deaths; rather, estimates reflect the sum of the small contributions that air pollution exposure make to life-expectancy reductions amongst all individuals in the population. Impact estimates should not be summed.

Although impact quantification estimates are imprecise, the significance of outdoor air pollution as a public health priority is unequivocal. Evidence linking poor health outcomes with exposure, even low pollutant concentrations, continues to strengthen. It is therefore plausible that everyone is affected by air pollution to some extent, it is essential to take action at national and international levels to reduce air pollution and risks for everyone. It is equally important to recognise that local action is needed too. This is because Wales-level data can mask localised problems that arise from significant small-area variations in air pollution concentrations, exposure potential and health impacts.

To place some context around the extent of local problems, around 40 air quality management areas (AQMAs) have already been declared by local authorities across Wales (as at June 2017). The statutory Local Air Quality Management (LAQM) regime requires an AQMA to be declared and a local action plan to be implemented wherever actual or likely breaches of pollutant-specific air quality objectives are identified¹⁰.

2.2 Vulnerable population groups and inequalities

In these localised air pollution ‘hotspot’ areas, high air pollution concentrations are not the only concern. It is well-documented that different people are affected in different ways by air pollution exposure; for example, children, older people and those with chronic lung or heart conditions are considered more vulnerable to the effects of air pollution exposure¹¹. Beyond these groups, it is possible that others are at a higher risk e.g. those working in polluted places or commuting to work through heavily congested urban areas.

Research also shows that people living in the deprived areas may also be more susceptible to air pollution than those who live in least deprived areas¹². This is a problem because analyses of local air pollution, multiple deprivation and health data in Wales shows that average air pollution concentrations are consistently highest in ‘most’ deprived areas (Fig.3)¹³. It is noteworthy that the next highest average air pollution concentrations are experienced in ‘least’ deprived areas.

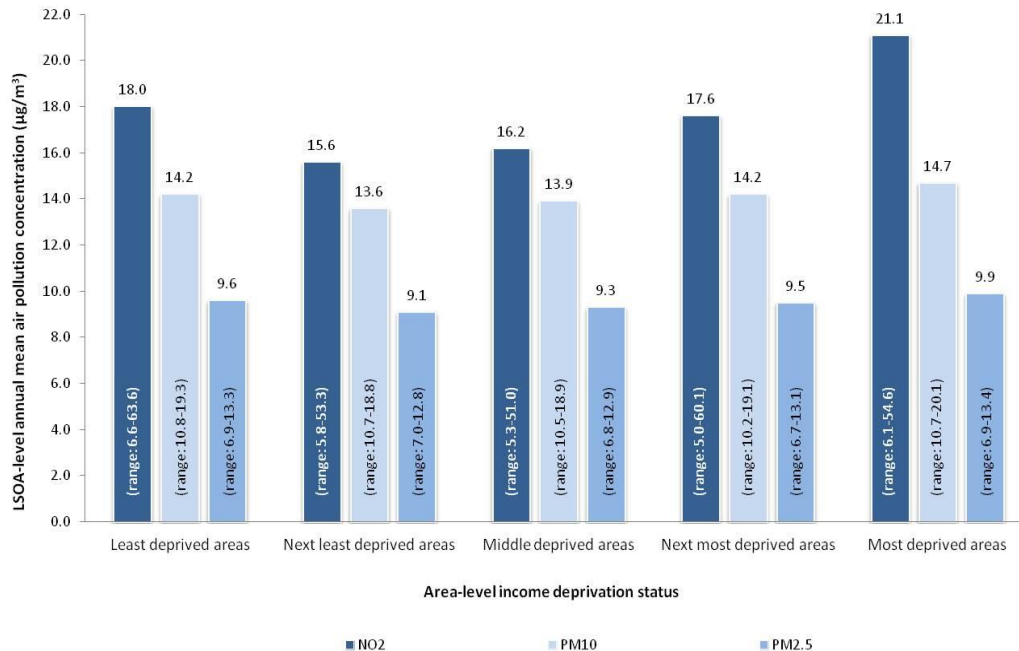


Fig.3. Wales’ local annual mean air pollutant concentrations (and ranges) by income deprivation status, 2011-13

¹⁰ Welsh Government (2017). Local air quality management in Wales policy guidance. Welsh Government: Cardiff, UK.

¹¹ Fann N, Roman HA, Fulcher CM *et al.* (2011). Maximising health benefits and minimizing inequality: incorporating local-scale data in the design and evaluation of air quality policies. *Risk Anal*; 31(6):908-22.

¹² Goodman A, Wilkinson P, Stafford M *et al.* (2011). Characterising socioeconomic inequalities in exposure to air pollution: a comparison of socioeconomic markers and scales of measurement. *Health Place*; 17: 767-774.

¹³ Brunt H, Barnes J, Jones SJ, Longhurst JWS, Scally G, Hayes ET (2016). Air pollution, deprivation and health: Understanding relationships to add value to local air quality management policy and practice in Wales, UK. *J Public Health*; 39(3): 485-497.

The same study also revealed that the *triple jeopardy* concept - where air pollution, impaired health and deprivation interactions can strengthen associations and create disproportionate disease burdens between and within communities (inequalities) - is at play in Wales. To illustrate this point in the context of PM₁₀ pollution, the study reported that, compared with 'low' pollution and 'least' deprived areas, rates of respiratory mortality were twice as high in 'low' pollution and 'most' deprived areas, and increased to 2.4 times as high in 'high' pollution and 'most' deprived areas.¹²

All of this evidence suggests that it is a mistake to consider air pollution problems (and solutions) in isolation. Understanding of air pollution and its relationships with wider health determinants is essential; acting on only a limited understanding of these relationships, or worse ignoring them altogether, could compound problems through ill-informed decisions and ineffective or poorly-targeted intervention. This is where public health professionals and other NHS Wales staff, as well as specific tools such as health impact assessments, can help.

3. Air quality management in context

It is in the interests of NHS Wales' services and staff to take, and support, action to reduce air pollution, risks and inequalities. Improving air quality can lead not only to a more [globally responsible] sustainable Wales, but also to a healthier, safer and more productive population with reduced demands on health and other public services. Achieving this – by understanding air pollution problem complexities and acting efficiently and effectively to overcome them – requires a significant collective commitment from partners working across multiple sectors and disciplines.

Air pollution is everyone's business

Not only is it essential for there to be good awareness, collaboration and action across relevant public bodies, sectors and systems (e.g. transport, planning, regulation, health, public protection, sustainable development); but members of the public have an important contribution to make too.

The air quality management framework in Wales is set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (underpinned by Part IV of the Environment Act 1995)¹⁴. It commits to ensure access to good quality air for all citizens via two complementary approaches:

- **National**-level policy measures seeking to drive large-scale improvements e.g. legislation; emissions standards setting; and fuel, vehicle and other technology developments; and
- **Local** air quality management (LAQM) regime implementation, where Local Authorities must work with others to assess and manage air pollution in their areas. When actual or likely breaches of national air quality objectives are identified, AQMAs are declared and local air quality action plans developed to tackle problems.

The 'local' approach recognises that specific pollution sources are best managed at the lowest administrative level through proportionate, collaborative action that accounts for the local context. Whereas LAQM has historically focused on tackling problems in small-area air pollution 'hotspots', a broader approach has recently been advocated. LAQM policy guidance issued by Welsh Government in June 2017 now encourages universal action to reduce air pollution and risks for all alongside targeted needs-based intervention in designated AQMAs to protect those who are worst affected. Given that interactions between air pollution and deprivation status can increase health risks, it is also important that actions are not restricted to just those areas where air pollution is worst, but extended to areas where health needs are highest. Doing this, and considering air pollution alongside other health risk factors, can help inform action to reduce risks and inequalities.

¹⁴ Defra (2007). The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (volume 1). Defra: London, UK.

Adopting an approach that fully understands the complexities of air pollution problems, especially links with broader health determinants, presents a real challenge. However, this may also be regarded as an opportunity; interactions between air pollution and many other health-influencing factors increase the range of possible solutions to help tackle problems. Further, addressing one part of the interconnected 'web of influence' is likely to help deliver multiple benefits elsewhere. For example, local actions to address the health impacts of air pollution on local populations can play a critical role in supporting other local priorities such as active travel, health inequalities, integrated care, sustainability, growth and regeneration, and localism and community engagement.

To illustrate this point, the following example explores the risks and opportunities presented by relationships between air pollution, urban planning and active travel:

Reducing air pollution and risks through urban planning and active travel

While there are numerous influences on air pollution and health in Wales, urban planning/design and active travel are two linked systems that serve as both contributors and solutions to current problems. Importantly, both are areas where Public Health professionals and other NHS Wales staff can bring about policy and practice change through advocacy, influence and action (Fig.4).

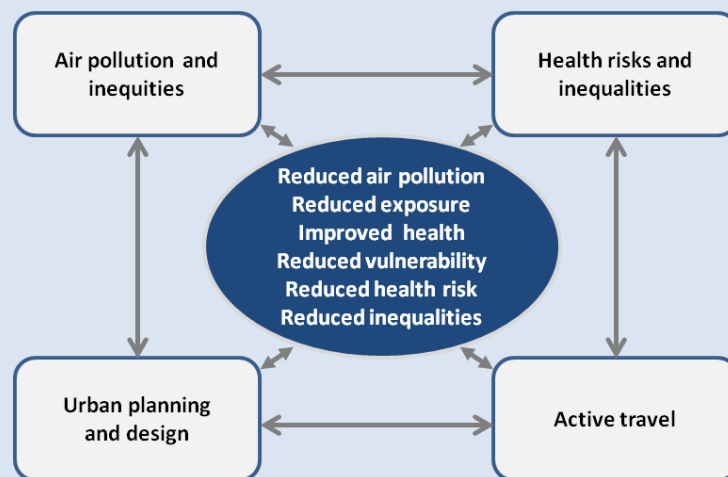


Fig.4. Air pollution, health, planning and active travel matrix

In terms of urban planning and design, it is well-documented that poorly designed developments (including industry), urban sprawl with inadequate public transport systems, and poor housing are major causes of increased exposure to air pollution¹⁵. While it is often the case that the outcomes of poor planning are difficult to reverse, the rewards of acting to prevent 'more of the same' over the next half century are potentially significant for current and future generations. Intelligent integrated action in this area can help to separate people from polluted environments, reducing exposure potential, health risks and inequalities. Similarly, smart planning and community design can encourage and support activities such as active travel which directly leads to reduced air pollution. The intelligent use of spatial planning tools and data can bring about community enhancements that can also help deliver broader public health benefits such as fewer injuries, equitable service, amenity provision and access, and community cohesion.

As for active travel, getting people routinely walking and cycling rather than using cars can directly reduce traffic, emissions (including noise) from road transport and adverse impacts on local air and sound-scape quality. The activity is associated with better health outcomes i.e. a lowered prevalence of type 2 diabetes¹⁶ and reduced risks of cardiovascular diseases¹⁷. Importantly, these improved health outcomes reduce vulnerability among individuals and communities. In terms of benefits, active travel can reduce greenhouse gas emissions and societal reliance on non-renewable fuels, which have broader positive implications in the context of climate change, environmental sustainability and resilience.

¹⁵ Science for Environment Policy (2016). *Links between noise and air pollution and socioeconomic status*. In-depth report 13 produced for the European Commission, DG Environment by the Science Communications Unit, UWE, Bristol. Access: <https://ec.europa.eu/science-environment-policy>

¹⁶ Pucher J, Buehler R, Bassett DR *et al.* (2010). Walking and cycling to health: a comparative analysis of city, stater and international data. *Am J Public Health*; 100 (10): 1986-1992.

¹⁷ Hamer M, Chida Y (2008). Active commuting and cardiovascular risk: a meta-analytical review. *Prev Med*; 46 (1): 9-13.

4. What you can do to help

4.1 Working to key principles

Despite some knowledge gaps, there is sufficient evidence to enable action across NHS Wales to reduce air pollution, risks and inequalities. Continuing to advocate for large-scale changes that can have positive benefits for everyone remains a priority e.g. designing/using cleaner vehicles, fuels and technology. However, of equal importance is the need to take action locally e.g. to promote and facilitate active travel. To reduce air pollution, exposure, vulnerability and disproportionate disease burdens, effective interventions must be implemented in high pollution *and* poor health areas. In general, public health professionals and other NHS Wales staff should strive to adopt these aims:

1. *Supporting others to assess and appropriately prioritise air pollution in local areas*

Support local authorities and others to assess and frame air pollution risks in a health *and* environmental context. Public Health Wales' Environmental Public Health Team can advise and support this work. Considering air pollution problems and solutions in a broad public health context can help improve collective understanding of circumstances, especially in high risk areas and populations, and generate evidence to inform shared priority setting, planning and action.

2. *Engaging senior local decision-makers to take local action on air pollution*

Ensure that air pollution is assessed and prioritised appropriately. Actions will depend on problem scale and how this compares and links with other public health priorities. It is important to make tackling air pollution a strategic priority amongst senior local decision-makers, especially in areas where air quality challenges persist. Achieving this through advocacy and leadership can facilitate the development of shared goals and purposeful, co-ordinated action across local authorities and NHS Wales, with communities. Further, professionals can work with others to help them accurately predict the likely health consequences of different options early on in any decision-making process and so make informed decisions based on all the relevant scientific evidence.

3. *Communicating with the public (including patients) about local air pollution*

Good standardised communications to patients and the wider public is crucial, not only because people *should* be informed about risks, but because they *want* and *expect* to be informed. Members of the public should be reminded that they can act to realise opportunities to improve their own health e.g. through reducing personal exposure to air pollution, reducing personal contribution to air pollution, and/or supporting and advocating actions to tackle air pollution locally. Increasing public awareness around, and involvement in, local initiatives can also lead to greater opportunities to measure air pollution and evaluate intervention impacts. It is important for such information and advice (available at: www.welshairquality.co.uk) to be co-ordinated across public bodies so as not to confuse or dilute important messages.

4. *Championing air quality improvement both outside and inside their organisations*

Air pollution mitigation should be championed in a broad environmental sustainability improvement context. Opportunities should be seized to influence ways in which organisations operate to reduce environmental impacts e.g. assess air quality impacts of policies and decisions (including through proportionate use of health impact assessments), invest in sustainable local services, upgrade equipment/technology, estates and vehicle fleets to reduce emissions, and promote environmentally sustainable behaviours across staff bodies.

4.2 Objectives and specific actions

More specifically, NHS Wales staff can support, and where appropriate lead, the implementation of a suite of interventions (Fig.5).

Objective	Action	Example interventions	Suggested lead
To scope and understand air pollution problems in the context of broader health influences	Support others to assess air pollution and health risks	Assess local air pollution risks (using available information) in the broadest possible public health context to understand connections and interactions between air pollution and other health determinants	Director of Public Health (and Local Public Health Team), Health Protection lead
		Help others working to reduce air pollution to prioritise actions (see below) to maximise health gains. Reduce risks for all <i>and</i> target interventions in areas with worst air pollution, health and deprivation status, and where there are vulnerable people e.g. hospitals	Director of Public Health (and Local Public Health Team), Health Protection lead
		Undertake research to generate new evidence that continues to improve understanding and inform action	Director of Public Health (and Local Public Health Team), Health Protection lead
		Evaluate impacts and effectiveness of local interventions in health as well as air quality terms	Director of Public Health (and Local Public Health Team), Health Protection lead
		Make appropriate use of health impact assessments, and input into relevant health impact assessments being carried out locally.	Director of Public Health (and Local Public Health Team)

<p>To reduce existing air pollution problems, risks and impacts</p>	<p>Support others to mitigate air pollution and associated risks</p>	<p>Work with others (including Public Service Boards and planning and transport colleagues), to support the following actions in Local Health Board areas:</p> <p>Develop travel plans to help people reduce motorised trips e.g. car clubs 'Green' open polluted areas Establish Clean Air Zones (with clear linked actions) to minimise vehicle emissions in 'high risk' air pollution and health areas Congestion charging zones; evaluate impacts Consider speed restrictions; evaluate impacts Support low emission travel among residents, visitors and commuters e.g. promoting and facilitating walking and cycling and electric charge points Promote, encourage and support zero emission travel among residents, visitors and commuters – advocate for different yet complementary approaches to promote active travel. Provide supporting infrastructure</p>	<p>Director of Public Health (and Local Public Health Team), NHS Trust Estates/facilities and sustainability leads and/or champions</p>
<p>To create healthy, fair and sustainable communities</p>	<p>Advise and support planners and regulators to ensure air quality is considered in plans for new developments</p>	<p>Improve air quality through effective long-term planning (at local, regional and national levels)</p> <p>Input to the assessment of planning applications to identify and create opportunities to: minimise the need for motorised travel, minimise public exposure (especially amongst vulnerable populations), avoid creating problems through poor community, street and building design, provide infrastructure to support low and zero emission travel</p> <p>Make appropriate use of health impact assessments and input into relevant health impact assessments being carried out locally</p>	<p>Director of Public Health (and Local Public Health Team)</p> <p>Director of Public Health (and Local Public Health Team), Director of Planning, and Health Protection lead</p> <p>Director of Public Health (and Local Public Health Team)</p>

To raise awareness of air pollution problems, risks and solutions	Provide information to the public, including patients, to reduce risks and drive behaviour change	Provide public and patients with information on air pollution health effects, the influence of travel choices, impact of vehicle engine 'idling', and exposure minimising measures	Director of Public Health (and Local Public Health Team), Directors of Medicine and Nursing
		Ban engine idling at all NHS facilities	Estates/facilities leads
		Ensure that cardiovascular and respiratory chronic disease care pathways refer to walking and cycling options so that patients receive meaningful and timely information to allow them to make informed decisions to change behaviour. Link information to the Daily Air Quality Index	Directors of Medicine and Nursing
		Use behavioural insights to explore and use different communication methods to increase message reach for target audiences	Communications leads
		Deliver regular training to raise awareness amongst Public Health professionals and other NHS Wales staff (e.g. through tailored training programmes for GPs (through GP clusters), nurses, public health specialists); ensure co-ordinated communications are clear and consistent	Health Protection lead
		Raise awareness of health impacts of local air pollution with NHS colleagues in Health Board and primary care	Director of Public Health (and Local Public Health Team), Health Protection lead
		Early intervention - Raise awareness of health benefits of, and encourage, active travel amongst children	Director of Public Health (and Local Public Health Team), Health Protection lead, GPs, school nurses, health visitors

To minimise public health risks arising from incidents that affect air quality	Work with others to manage public health risks associated with acute and chronic incidents	Engage in multi-agency emergency planning activities (e.g. plan development, simulated exercises) to increase preparedness awareness, expertise and capacity to respond in the event of an environmental incident	Health Protection lead
		Develop plans to define agency roles and responsibilities and prescribe clear and consistent incident response arrangements	Health Protection lead
		Deliver multi-agency training to increase expertise, capacity and resilience	Health Protection lead
		Support multi-agency incident response (including assessing air quality impacts and public health risks)	Health Protection lead
		Communicate risks to public and describe measures that can be taken to minimise exposure	Director of Public Health (and Local Public Health Team), Health Protection lead, Communications lead
		Communicate risks to patients and describe measures that can be taken to minimise exposure	Directors of Medicine and Nursing

<p>To reduce environmental impacts from NHS estates, facilities and services</p>	<p>Work with others internally to influence and support action to improve organisational environmental sustainability</p>	<p>Develop and implement environmental sustainability strategies to:</p> <ul style="list-style-type: none"> Assess and minimise air quality impacts of decisions made on new policies, services, projects and actions Introduce sustainable procurement policies/practices Invest in technology to reduce non-essential staff travel Encourage and support low and zero emission travel Reduce emissions from facilities Reduce emissions from services e.g. upgrade vehicle fleets, support educational initiatives to improve staff driving techniques 	<p>Estates/facilities, and sustainability leads</p>
---	---	---	---

Fig.5. Interventions that public health specialists and other NHS Wales staff can lead and/or support

Many of these interventions are recommended by the National Institute for Health and Care Excellence (NICE)¹⁸ but unfortunately cost effectiveness (and return on investment) evidence is not available for all measures suggested. That said, the King's Fund report on *Improving the Public's Health* reported that "the cost-benefit evidence for investing in air quality is substantial"¹⁹. They cite a review for the London Royal Borough of Kensington and Chelsea which identified a series of options for reducing air pollution that were "cost-beneficial, with potential for significant revenue generation, and spill over benefits including noise reduction. The overall benefit-to-cost return was £620 in benefits for every £100 spent"²⁰. However, this should be translated with caution because of the differences in air pollution contexts between London and Wales (more generally).

NICE suggests that small-scale actions on their own are unlikely to lead to the significant reductions in air pollution needed to protect health. Rather, it is recommended that multiple interventions are driven forwards in parallel; with each producing a small benefit, a multiple-intervention approach would likely act cumulatively to produce significant change (both in terms of air pollution mitigation and population health adaptation and improvement). An inevitable consequence of such an approach is that quantitative evaluation of individual intervention effectiveness is difficult, but this should not act as a barrier to action. New ways of working are required to achieve this i.e. joined-up thinking and working between stakeholders (including the public) and across systems, with a strong consideration of problems in the context of people, places and linked health determinants.

¹⁸ NICE (2017). Air pollution: outdoor air quality and health. <https://www.nice.org.uk/guidance/ng70>

¹⁹ <http://www.kingsfund.org.uk/publications/improving-publics-health>

²⁰ Kilbane-Dawe I (2012). *Cost Effective Actions to Reduce Air Pollution In Central London*. Parliament Hill Research. http://www.rbkc.gov.uk/pdf/air_quality_cost_effective_actions_full_report.pdf

5. Connecting policy and practice

NHS Wales cannot reduce air pollution, risks and inequalities in isolation; effective air quality management is very much a collaborative endeavour. Although not always recognised or realised, the contribution that public health specialists and other NHS Wales staff can make to multi-sector/disciplinary air quality management efforts is significant at local, regional and national levels. Increasing collaboration between health, public health and environmental policy and practice not only has the potential to inform and enhance national policy development and implementation to tackle large-scale issues, but can also facilitate local and regional-level integrated action to assess, communicate and manage population-level risks.

There has never been a better opportunity in Wales for partners to work in different ways *within*, and more importantly *across*, inter-connected systems to improve air quality and health. However, positive change requires a conscious collective effort to look beyond well-established air quality management regimes to seek out and seize innovative solutions to problems. Real opportunities now exist to link air quality management with broader policy e.g. the **Environment (Wales) Act 2016**, **Planning (Wales) Act 2015**, **Active Travel (Wales) Act 2013**, **Public Health (Wales) Act 2017** and **Climate Change Act 2008**. Intervention across whole systems, supported by this legislation, can improve individual and population health, and reduce air pollution, risks and inequalities.

Perhaps the most important enabler of all however is the **Well-being of Future Generations (Wales) Act 2015**. This Act calls for sustainable cross-sector action based on the principles of long-term, prevention-focused integration, collaboration and involvement. It intends to improve economic, social, environmental and cultural well-being in Wales to ensure the needs of the present are met without compromising the ability of future generations to meet their own needs. The Act places responsibilities on public bodies in Wales to work in new ways (including via Public Services Boards) towards national Well-being goals. Progress is measured against a suite of well-being and Public Health Outcomes Framework indicators; there is one specifically concerned with air pollution²¹. Reducing air pollution, health risks and inequalities can help contribute to most, if not all, of the well-being goals. As such, the Act presents excellent opportunities to change policy and practice to enhance air quality management arrangements, particularly at the local and regional levels.

Research carried out in Wales corroborates this. A study – to identify ways to enhance the LAQM regime to maximise public health awareness, integration, collaboration and impact - concluded that recognising and realising synergies, and creating and adopting more effective and efficient ways of working across air quality management and public health agendas can help achieve well-being goals²². For example, increasing integration and collaboration amongst environmental health specialists, public health professionals and other NHS Wales staff can support joined-up action (where air pollution problems and solutions are considered in context alongside broader public health priorities) that can deliver multiple positive

²¹ Welsh Government (2016). How to measure a nation's progress? National indicators for Wales. Welsh Government. <http://gov.wales/docs/desh/publications/160316-national-indicators-to-be-laid-before-nafw-en.pdf>

²² Brunt *et al.* (2018). Enhancing Local Air Quality Management to maximise public health integration, collaboration and impact: a Delphi study. *Journal of Environmental Science and Policy*; 80: 105-116.

health impacts across the Welsh population. Health impact assessments, which are well established in Wales and supported by the Wales Health Impact Assessment Support Unit within Public Health Wales, provide a mechanism to support this work. Further, broadening the scope of air quality management efforts can help identify and reduce air pollution inequities and health inequalities to create a fairer Wales. These improvements can increase population cohesion, resilience, productivity and prosperity, and contribute to Wales being a globally responsible country.

6. Communicating important messages

Since air pollution has many of the characteristics that make a threat to health more worrying, it is important that patients and the wider public who may be affected by long-term exposures have access to balanced and accurate information. So-called ‘fright factors’ (such as air pollution exposure being invisible, involuntary, inequitably distributed, inescapable and unfamiliar) make this a challenging task. As such, care is needed around how information is communicated. If communications are poorly thought-through and handled, they can create a real risk of counter-productive reactions.

6.1 Communications to the public around long-term air pollution exposure

It is recommended that air pollution communications align with six basic principles¹⁸ (Fig.6) and follow generic best practice (i.e. listen and empathise, situation focus, exchange information to build relationships/involvement, sustain to build trust, honesty, and seek to ‘connect’ not ‘control’)

Explain what air pollution is	Use information about what particulates and other pollutants are made of and where people can go to get air pollution onto the local agenda – not statistics about health consequences
Help people understand how they can protect themselves	Do not raise public concern about air pollution unless you can at the same time satisfy people’s desire to do something to reduce their exposure
Explain the health impacts	Focus on what is known for certain about the health consequences of air pollution
Make it local	Talk about air pollution as a problem linked to specific places and not as a general problem
Explain how individuals can make a difference	Keep the focus on practical short-term improvements that can contribute to long-term solutions
Demonstrate leadership and empower communities	Do not simply expect individuals and communities to change their behaviour, work with them to empower and embed change

Fig.6. Basic principles to support all air pollution-related communications

Adhering to these principles is most appropriate when communicating long-term exposure concerns (over years, perhaps as a result of living somewhere with elevated air pollution concentrations e.g. an urban area with problems associated with traffic congestion) and example text is provided elsewhere²³. However, they can also be used to support communications in respect of short-term exposure concerns (over hours or days, perhaps due to outdoor air pollution episodes that tend to occur during spring and summer).

²³ Defra and PHE (2017). Air quality toolkit for Directors of Public Health. Defra: London, UK. Accessed: <https://laqm.defra.gov.uk/assets/63091defraairqualityguide9web.pdf>

6.2 Communications around short-term air pollution exposure

Special arrangements are in place to support communications around short-term air pollution risks. NHS Wales staff should help disseminate local messages to patients and the wider public during air pollution episodes. Evidence suggests that when air pollution concentrations are high, adults suffering from cardio-vascular disease, and adults and children with lung conditions, are at increased risk of showing symptoms and needing treatment. Only a minority of those who suffer from these conditions are likely to be affected, but it is not possible to predict who these will be. When air pollution concentrations are very high, more people (not just those with chronic illnesses) may be affected. Clear communications can increase awareness of these episodes amongst patients and the wider public and enable them to reduce personal exposure by avoiding high pollution areas and be better prepared to manage any chronic illnesses more effectively.

Air pollution across the UK is forecast (up to 5 days in advance) by the Met Office and presented using the Daily Air Quality Index (DAQI). In Wales, these forecasts can be accessed at <http://www.welshairquality.co.uk/> where air pollution is assigned a value between 1 and 10 (with 1 being the lowest pollutant concentrations and 10 the highest) and index banded as either 'low', 'moderate', 'high' or 'very high' (Fig. 6). In the event of an air pollution episode, Public Health Wales' Environmental Public Health Team will work in conjunction with Welsh Government, local authorities and Public Health England to disseminate proportionate advice to Health and Public Health professionals and the public based on agreed messages (Fig.7).

Air Pollution Level (DAQI score)	Health messages for at-risk individuals*	General message
<p>Low (DAQI 1-3) 'Low' bands indicate air pollution levels where it is unlikely that anyone will suffer adverse effects, including people with lung or heart conditions who may be more susceptible</p>	Enjoy your usual outdoor activities.	Enjoy your usual outdoor activities.
<p>Moderate (DAQI 4-6) 'Moderate' band represents levels of air pollutants at which there are likely to be small effects for susceptible people only</p>	Adults and children with lung problems, and adults with heart problems, who experience symptoms, should consider reducing strenuous physical activity, particularly outdoors.	Enjoy your usual outdoor activities.
<p>High (DAQI 7-9) Values for the 'High' bands are associated with significant effects in susceptible people</p>	Adults and children with lung problems, and adults with heart problems, should reduce strenuous physical exertion, particularly outdoors, and particularly if they experience symptoms. People with asthma may need to use their reliever inhaler more often. Older people should also reduce physical exertion.	Anyone experiencing discomfort such as sore eyes, cough or sore throat should consider reducing activity, particularly outdoors.
<p>Very High (DAQI 10) At 'Very High' levels of air pollution even healthy individuals may experience adverse effects of short-term exposure</p>	Adults and children with lung problems, adults with heart problems, and older people, should avoid strenuous physical activity. People with asthma may need to use their reliever inhaler more often.	Reduce physical exertion, particularly outdoors, if you experience symptoms e.g. cough, sore throat.

*Adults and children with heart or lung problems are at greater risk of symptoms. They should follow their doctor's usual advice about exercising and managing their condition. It is possible that very sensitive individuals may experience health effects even on Low air pollution days. Anyone experiencing symptoms should follow the guidance provided above.

Fig.7. Daily Air Quality Index (DAQI) bands and advice

7. Capturing feedback

It is intended that this guidance will be reviewed periodically to ensure up-to-date examples of air quality management innovation and best practice are captured and shared. Evaluating progress will not only help evolve air quality management policy and practice across the NHS in Wales but also illustrate how organisations are working collaboratively and sustainably to meet the principles and requirements of the Well-being of Future Generations (Wales) Act 2015.

8. Evidence links and other useful resources

The following list of web links sign-posts through to the detailed information briefly referred to in this guidance. These broader materials help place this guidance in a wider context.

- **Wales Air Quality**
<http://www.welshairquality.co.uk/>
- **Public Health Wales**
<http://www.wales.nhs.uk/sitesplus/888/page/81974>
- **Wales Health Impact Assessment Support Unit**
<http://www.wales.nhs.uk/sites3/home.cfm?OrgID=522>
- **Welsh Government**
<http://gov.wales/topics/environmentcountryside/epq/airqualitypollution/airquality/?lang=en>
- **UK-Air**
<https://uk-air.defra.gov.uk/>
- **Defra air pollution toolkit for Directors of Public Health**
http://www.local.gov.uk/sites/default/files/documents/6.3091_DEFRA_AirQuality_Guide_9web_0.pdf
Covering:
 - Getting to grips with air pollution – the latest evidence and techniques
 - 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 on the long term impacts of air pollution
 - Air Pollution: an emerging public health issue. Briefing for elected members
- **Committee on the Medical Effects of Air Pollution**
<https://www.gov.uk/government/groups/committee-on-the-medical-effects-of-air-pollutants-comeap>
- **National Institute for Health and Care Excellence**
<https://www.nice.org.uk/guidance/NG70>

For more information, contact:

Public Health Wales Environmental Public Health Team

E-mail: publichealth.environment@wales.nhs.uk Telephone: 0300 00 300 32