

Public Health Wales

A general update and a demo of the Risk Assessment Tool for Outdoor Air Quality in Wales

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General Update

Support Welsh Government Policy

- Clean Air Advisory Panel
 - New air quality targets (PM2.5)
 - Air monitoring network
 - Domestic combustion
- 20mph default



General update (2)

Covid-19 and air quality

- Ricardo report
- Bonfire night, waste fires
- Heightened CO surveillance
- Indoor air quality and ventilation (work of TAG-E)

General update (3)

Public awareness

- Ella Adoo Kissi Debrah coroner report
- Better health messaging – greater public health awareness
- Updating health messaging for public and professionals
- Asthma messaging (PHE led)
- PHE leading update of health messaging within DAQI

Landmark ruling says air pollution contributed to death of 9-year-old



HEALTH 16 December 2020

By Adam Vaughan



Ella Kissi-Debrah died in 2013
The Ella Roberts Family Foundation



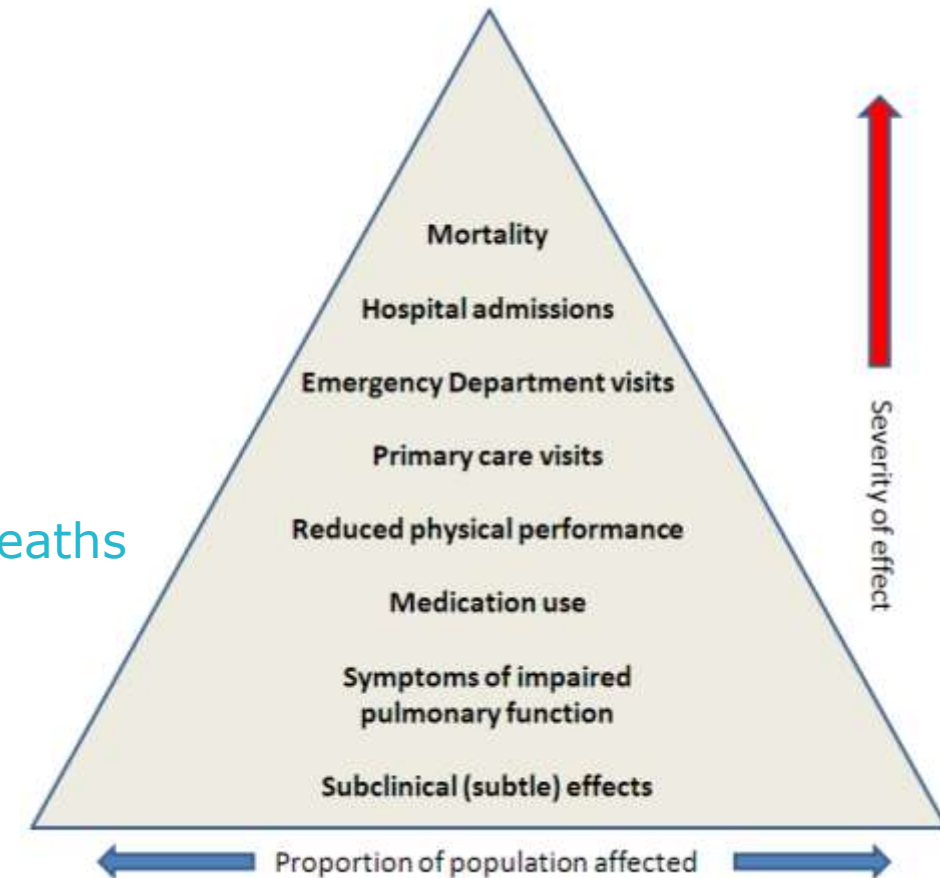
Recommended Actions and Health Advice

Air Pollution Banding	Value	Accompanying health messages for at-risk individuals*	Accompanying health messages for the general population
Low	1-3	Enjoy your usual outdoor activities.	Enjoy your usual outdoor activities.
Moderate	4-6	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.
High	7-9	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 find they 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.
Very High	10	Adults and children with lung problems, adults with heart problems, and older people, should avoid strenuous physical activity. People with asthma may find they need to use their reliever inhaler more often.	Reduce physical exertion, particularly outdoors, especially if you experience symptoms such as cough or sore throat.

Public Health Risk Assessment Tool for Outdoor Air Quality in Wales

Air pollution and health - Problem scope

- Largest environmental risk to health
- Pollutants of most concern: particulate matter (PM) and nitrogen dioxide (NO₂)
- Exposure ↑ mortality and morbidity risks
- Substantial health burden (UK):
 - Combined PM_{2.5}, NO₂: effect equivalent to 28-36,000 deaths
- 'Tip of the iceberg' – what about morbidity
- Life expectancy ↓ 6-8 months, on average

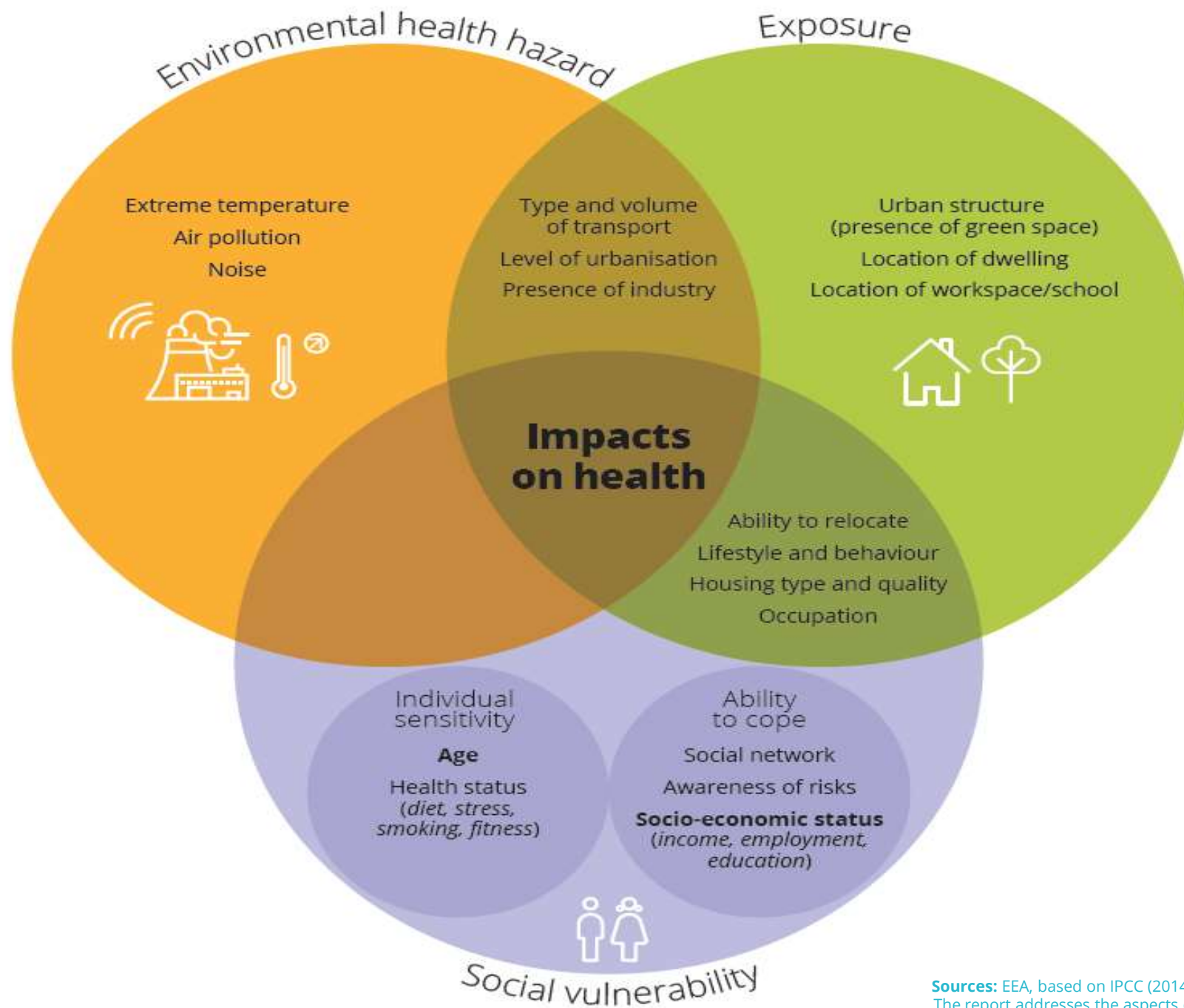


Wider interactions

Vulnerability and susceptibility

- National-level burden estimates mask local variations
- Some people are more at risk than others:
 - Differential vulnerability
e.g. exposure to high air pollution concentrations
 - Differential susceptibilities
e.g. intrinsic factors (age, sex, genetics)
e.g. acquired (Long-term limiting illness, behaviours, deprivation)
- Interaction with wider health determinants
- 'Triple jeopardy' concept





Sources: EEA, based on IPCC (2014b), WHO Europe (2010) and Aalbers et al. (2014). The report addresses the aspects of exposure and vulnerability to a varying extent.

Managing risks

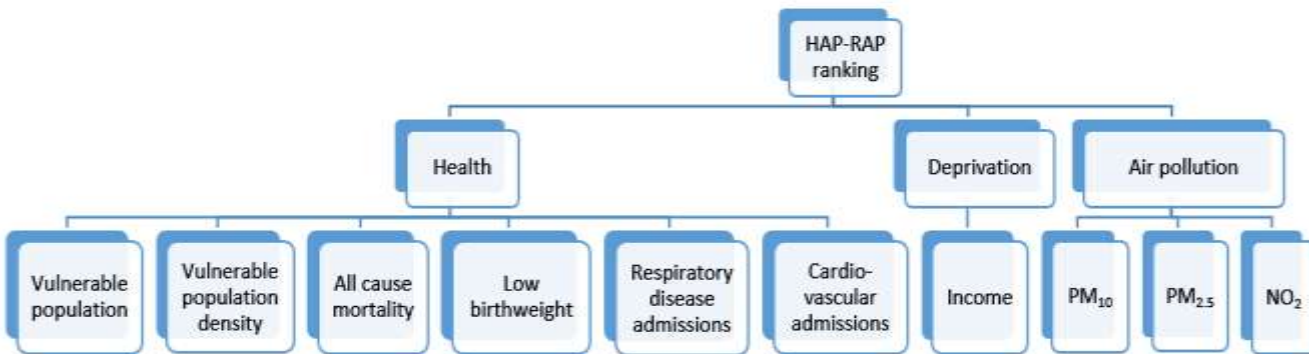
A public health-driven approach

- Compliance is priority, but risk management action should strive to reach beyond this
- Multi-discipline, cross-sector collaboration required
- Air pollution risks (and inequalities) - assessed in broadest possible public health context
 - to determine areas where populations most vulnerable (exposure) and susceptible (health) and where greatest health gain can be achieved
- Air pollution risks (and inequalities) - managed through **proportionate universalism** approach
 - where the resourcing and delivery of universal air pollution mitigation actions/services is at a scale and intensity proportionate to the degree of [air pollution and health-related] need

Public health-driven air pollution risk assessment

Cwm Taf pilot project

- Enhancing LAQM implementation by assessing air pollution risks in broader public health context
- Based on air pollution, deprivation and ill-health ‘triple jeopardy’, where most disadvantaged face:
 - increased risks from social and behavioural health determinants
 - greater risks from higher ambient pollution concentrations
 - an effect modification where exposure to pollutants exerts disproportionately large health effects
- New approach tested: *Health and Air Pollution Risk Assessment/Area Prioritisation (HAP-RAP)*



	Health	Deprivation	Air pollution	HAP-RAP	Number of people
Merthyr Tydfil	1	1	1	1	1
Merthyr Tydfil	2	2	2	2	2
Merthyr Tydfil	3	3	3	3	3
Merthyr Tydfil	4	4	4	4	4
Merthyr Tydfil	5	5	5	5	5
Merthyr Tydfil	6	6	6	6	6
Merthyr Tydfil	7	7	7	7	7
Merthyr Tydfil	8	8	8	8	8
Merthyr Tydfil	9	9	9	9	9
Merthyr Tydfil	10	10	10	10	10
Merthyr Tydfil	11	11	11	11	11
Merthyr Tydfil	12	12	12	12	12
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Merthyr Tydfil	100	100	100	100	100

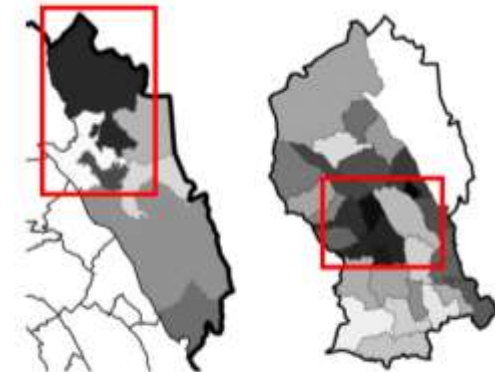


Figure 5. HAP-RAP clusters in Merthyr Tydfil (left) and Rhondda Cynon Taf (right)

Figure 3. Summary of HAP-RAP domains and components

Surveillance

- Crucial to fully understand problems and solutions
- Can help explore interactions between air pollution and health influences
- It is a mistake to consider air pollution as an isolated env. hazard
- Key objective of surveillance:
 - scope problems
 - monitor trends and patterns to understand distribution
 - generate hypotheses around association between different influences
 - evaluate intervention effectiveness
 - generate intelligence to guide decision-making and effective targeted intervention

Public Health Risk Assessment Tool

- Part of an evolving programme of EPH surveillance work.
- First module; Outdoor Air Quality in Wales.
- The focus is on particulate matter (PM_{2.5}) and nitrogen dioxide (NO₂) and interaction with wider health determinants.
- Free and easy to access – hosted on an online dashboard platform (Tableau).
- To be used by partners to inform risk assessments.

The four components

- Short-term air pollution (daily variation)
- Annual air pollution (long-term variation)
- Population vulnerability and susceptibility
- Health effects of long-term air pollution exposure

Air Quality in Wales Health Impact Assessment Tool by [Public Health Wales Health Protection](#)[Landing Page](#) | [Daily air pollution](#) | [Annual air pollution](#) | [Population vulnerability & susc...](#) | [Health effects](#) | [Definitions and sources](#)

Air quality in Wales

Public health risk assessment tool



This tool has been created by the Communicable Disease Surveillance Centre (CDSC) at Public Health Wales (PHW), with support from the Environmental Public Health Team. Data are provided up until 31/12/18. Any feedback or questions should be directed to surveillance.data@wales.nhs.uk

To navigate between the pages select the relevant box below, or select the home button to return to this page. Use the drop down menus at the top of the pages to filter by categories (health board, local authority, year and pollutant).

Daily air pollution

Annual air pollution

Population vulnerability & susceptibility to air pollution

Health effects to long-term air pollution exposure

Definitions and sources

Short-term air pollution (daily variation)



Year overview

Month overview

Annual air pollution (long-term variation)

Annual air pollution

Home

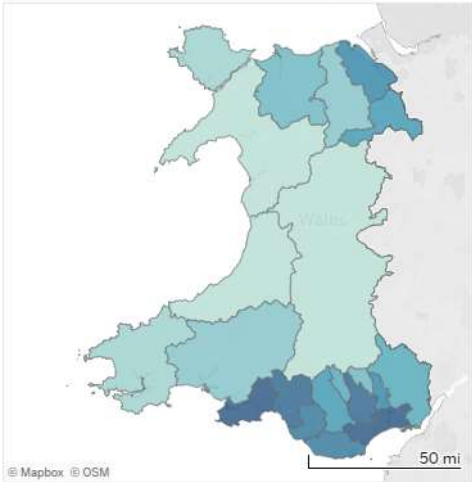
Pollutant

Year

Health Board

Local Authority

Annual mean NO2 concentrations by local authority coloured by decile (2018)



Map shows annual mean pollutant concentrations by local authority according to the selected health board or for all Wales. The data is ranked from lowest to highest for the health board selected, and coloured according to the percentile which the data falls within. The colour ranges from light blue (lowest pollutant concentration/percentile) to dark blue (highest pollutant concentration/percentile). Annual mean pollutant concentrations are 4.35 to 15.72 µg/m3 (where the lowest value is 0% and the highest value is 100%, within the selected area.)



Annual mean modelled NO2 concentrations over time (µg/m3)
Health Board: All; Local Authority: All

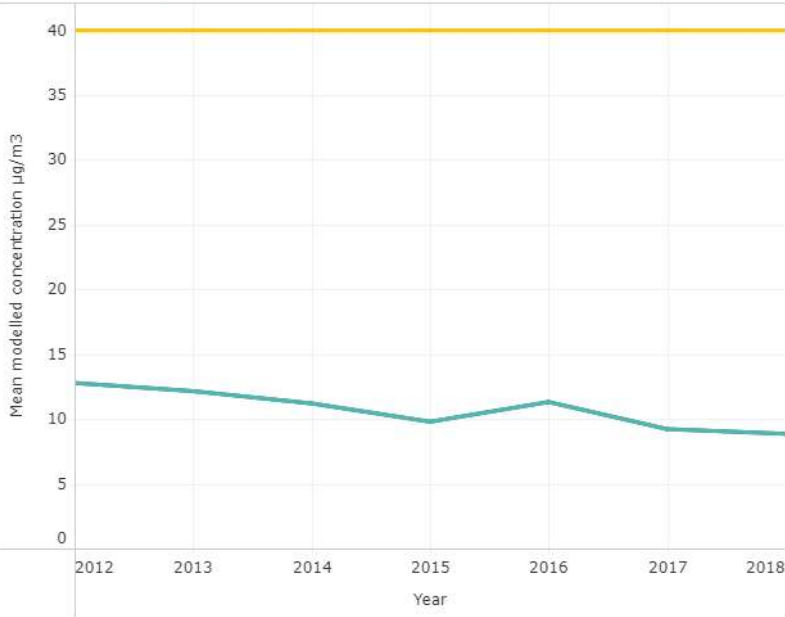
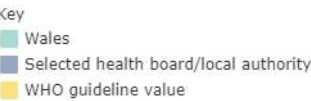


Chart shows the trend of annual mean modelled concentration for NO2 by year in µg/m3. The green line shows the average for Wales, the blue line shows the value for the selected LA/HB, and the yellow line shows the WHO guideline value.



Annual mean modelled concentration of NO2 (µg/m3) by local authority and income deprivation quintile (2018)

Local Authority	Income Quintile					Average
	1	2	3	4	5	
Blaenau Gwent	7.43	7.01	7.51	7.99		7.28
Bridgend	8.64	9.01	9.44	9.11	9.66	9.14
Caerphilly	8.89	8.96	9.78	9.47	10.38	9.38
Cardiff	15.52	16.55	15.78	16.21	15.32	15.72
Carmarthenshire	7.07	5.98	5.71	5.12	5.60	5.73
Ceredigion	4.29	4.86	4.12	3.92	5.42	4.49
Conwy	7.57	6.91	5.93	5.86	5.33	6.27
Denbighshire	6.80	6.77	6.22	5.62	4.78	6.04
Flintshire	9.83	8.92	8.77	9.08	8.46	8.86
Gwynedd	6.70	4.66	4.63	4.07	5.12	4.46
Isle of Anglesey	6.67	4.18	4.28	4.70	5.08	4.78
Merthyr Tydfil	7.93	7.78	8.05	8.65	7.72	7.93
Monmouthshire	7.72	9.34	7.56	7.66	7.26	7.64
Neath Port Talbot	9.92	8.98	8.49	10.14	8.79	9.27
Newport	15.11	14.75	16.50	15.08	12.44	14.65
Pembrokeshire	7.63	7.22	5.42	4.23	4.55	5.44
Powys	5.90	5.53	4.53	4.13	3.94	4.35
Rhondda Cynon Taf	7.92	8.30	8.99	9.96	9.80	8.66
Swansea	10.47	10.46	9.95	9.04	7.88	9.40
The Vale of Glamorgan	10.76	9.97	11.06	8.93	8.02	9.19
Torfaen	8.40	8.78	9.12	10.10	9.50	9.06
Wrexham	7.92	8.19	8.95	7.89	7.92	8.17
Average (selected LA's)	10.35	8.72	8.14	8.04	9.02	8.85

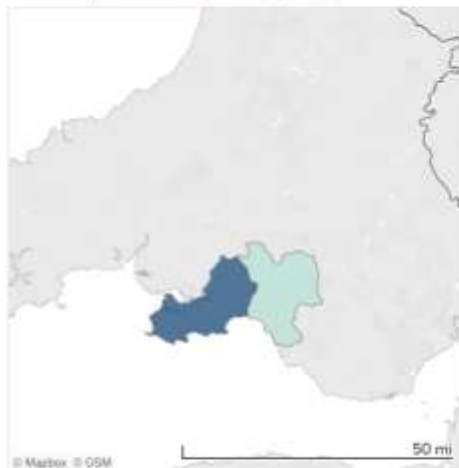
Table shows annual mean modelled concentration of NO2 (µg/m3) by local authority and income quintile for 2018, where income quintile 1 is most deprived and income quintile 5 is least deprived. Colour shows percentage difference from average for each local authority, ranging from -22.3% to 50.2% (yellow to dark green, where grey values are closest to the average). The average row shows the average annual mean modelled concentration for the local authorities visible in the selection. The average column shows the average concentration for the local authority.



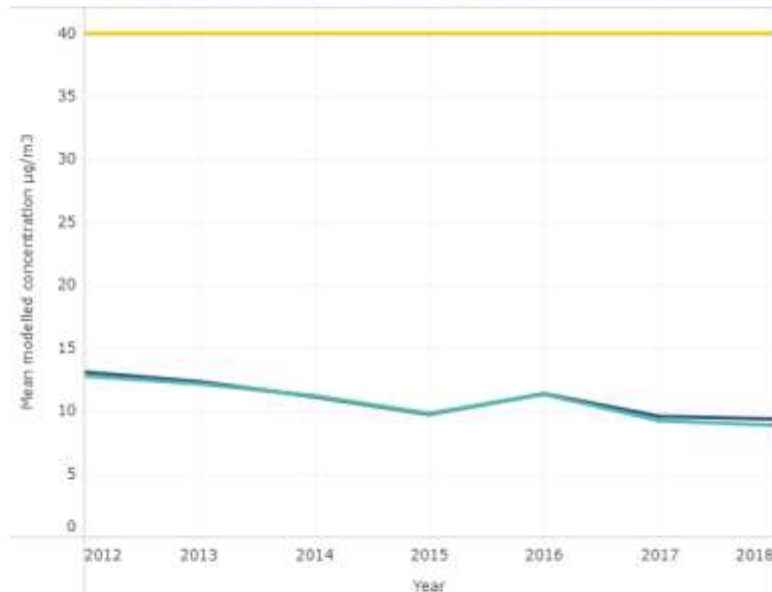
Annual air pollution

[Home](#)
 Pollutant: NO2
 Year: 2018
 Health Board: Swansea Bay UHB
 Local Authority: (All)

Annual mean **NO2** concentrations by local authority coloured by decile (2018)



Annual mean modelled **NO2** concentrations over time (µg/m3)
Health Board: **Swansea Bay UHB**; Local Authority: **All**



Annual mean modelled concentration of **NO2** (µg/m3) by local authority and income deprivation quintile (2018)

Local Authority	Income Quintile					Average
	1	2	3	4	5	
Neath Port Talbot	9.92	8.98	8.49	10.14	8.79	9.27
Swansea	10.47	10.46	9.95	9.04	7.88	9.40
Average (selected LA's)	10.27	9.59	9.31	9.49	8.03	9.35

Table shows annual mean modelled concentration of **NO2** (µg/m3) by local authority and income quintile for 2018, where income quintile 1 is most deprived and income quintile 5 is least deprived. Colour shows percentage difference from average for each local authority, ranging from -16.2% to 11.4% (yellow to dark green, where grey values are closest to the average). The average row shows the average annual mean modelled concentration for the local authorities visible in the selection. The average column shows the average concentration for the local authority.

Percentage difference from average



Population vulnerability and susceptibility to air pollution

Home

Pollutant

PM2.5

Health Board

(All)

Local Authority

(All)



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Proportion of population living in areas where PM2.5 is very low, low, moderate or high

Health Board: All; Local Authority: All

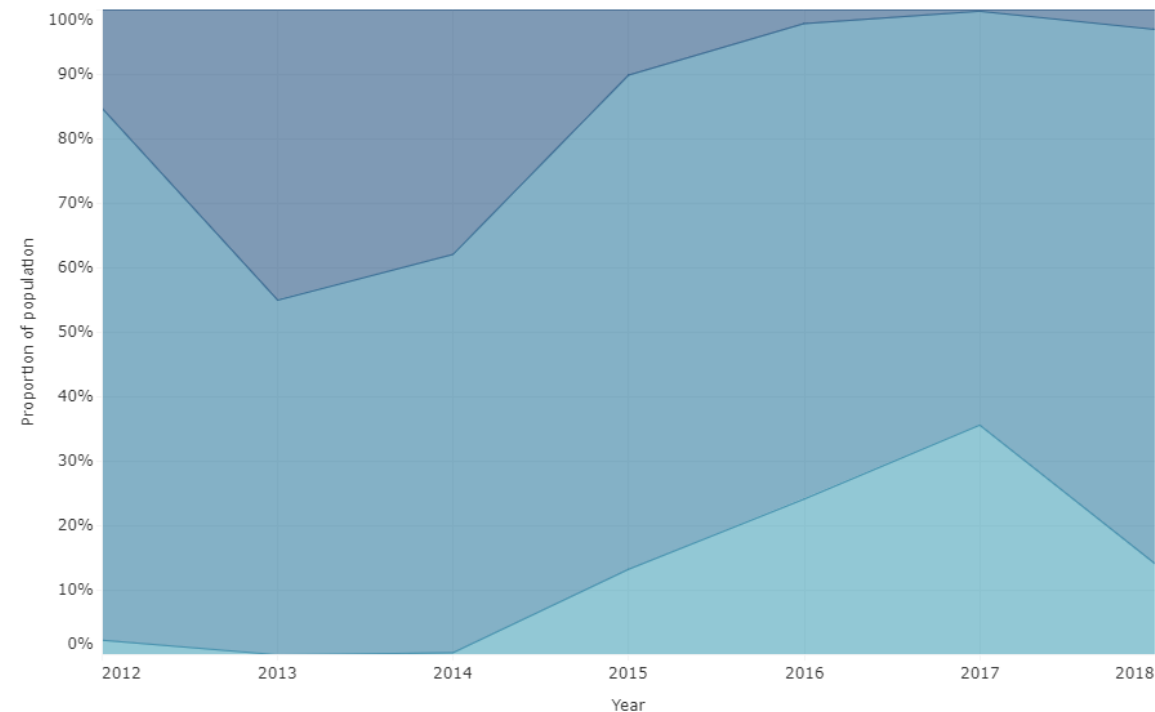
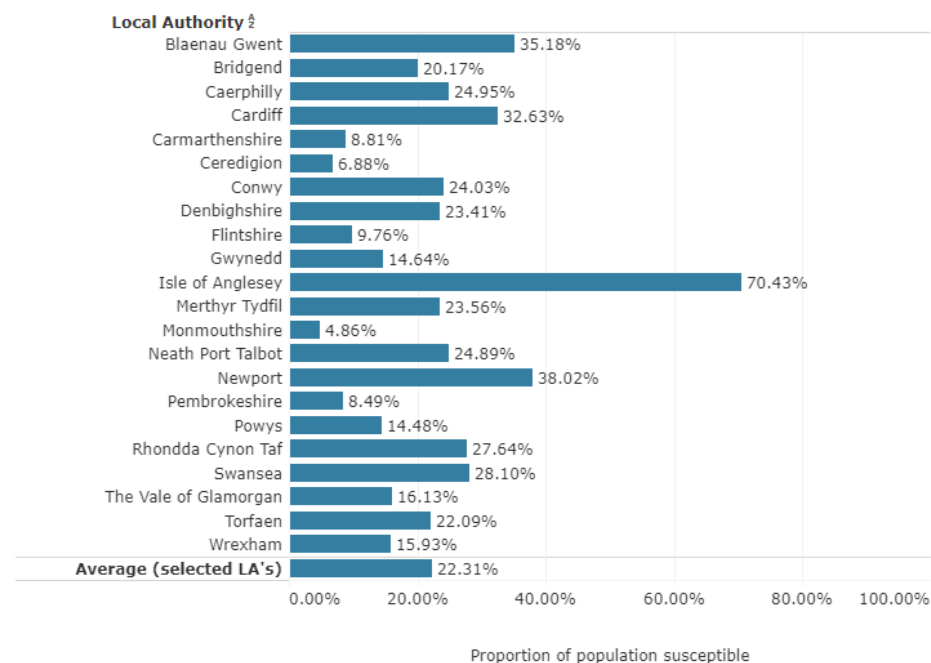


Chart shows proportion of total population living in a very low, low, moderate or high area of air pollution by year for selected pollutant, health board and local authority. Colour shows air pollution category. Air pollution categories are calculated using WHO guideline values and are different from those used in the DAQI calculations. They are defined as follows ($\mu\text{g}/\text{m}^3$); NO2: Very low 0-13.29, low 13.30-26.59, moderate 26.60-39.99, high 40+; PM2.5: Very low 0-3.29, low 3.30-6.59, moderate 6.60-9.99, high 10+

Proportion of population who are susceptible to air pollution Most deprived living with Moderate air pollution by local authority (PM2.5, 2018)

Year

2018



Air pollution category

- ☐ High
☒ Moderate
☐ Low
☐ Very Low

Susceptibility

- ☐ Aged 0-15 years
☐ Aged 65+ years
☒ Most deprived

Air pollution category

High

Moderate

Low

Very Low

Chart shows proportion of population living within selected air pollution category, health board or local authority who are susceptible to air pollution due to deprivation or age. The bottom bar shows the average proportion susceptible for the local authorities displayed above, i.e. if all health boards are selected this shows the average for Wales, if one health board is selected it shows the average for that health board. Select the relevant susceptibility and category from the filters to the right.



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Proportion of population living in areas where **PM2.5** is very low, low, moderate or high
Health Board: **All**; Local Authority: **All**

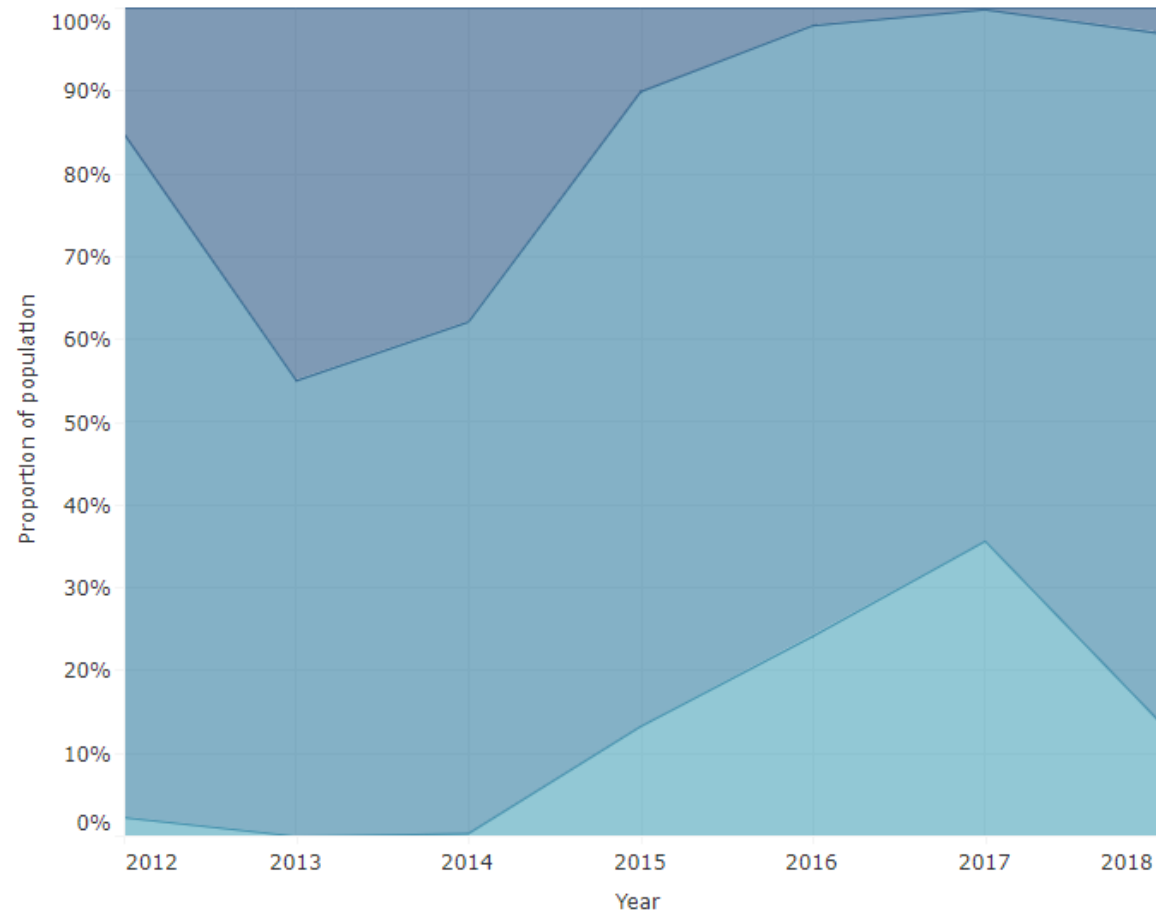


Chart shows proportion of total population living in a very low, low, moderate or high area of air pollution by year for selected pollutant, health board and local authority. Colour shows air pollution category. **Air pollution categories are calculated using WHO guideline values and are different from those used in the DAQI calculations. They are defined as follows ($\mu\text{g}/\text{m}^3$); NO2: Very low 0-13.1, low 13.2-26.5, moderate 26.6-39.9, high 40+; PM2.5: Very low 0-3.2, low 3.3-6.5, moderate 6.6-9.9, high 10+**

✚ a b | e a u

Example

- **Pollutant:** PM_{2.5}
- **Health board:** Cardiff & Vale UHB
- **Local Authority:** All
- **Results:**
 - **Low:** 0.98% of pop.
 - **Moderate:** 84.96% of pop.
 - **High:** 14.12% of pop.

Proportion of population who are susceptible to air pollution **Most deprived living with High air pollution by local authority (PM2.5, 2018)**

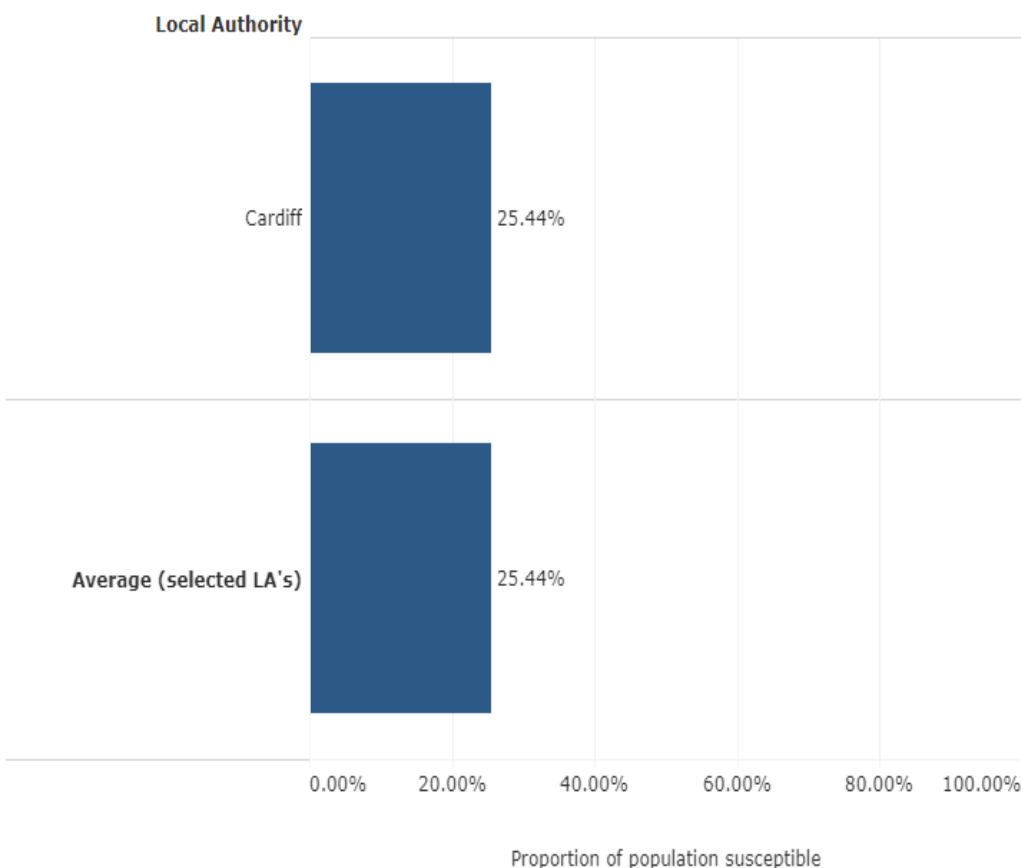


Chart shows proportion of population living within selected air pollution category, health board or local authority who are susceptible to air pollution due to deprivation or age. The bottom bar shows the average proportion susceptible for the local authorities displayed above, i.e. if all health boards are selected this shows the average for Wales, if one health board is selected it shows the average for that health board. Select the relevant susceptibility and category from the filters to the right.

Year

2018

Air pollution category

- ☒ High
- ☐ Moderate
- ☐ Low
- ☐ Very Low

Susceptibility

- ☐ Aged 0-15 years
- ☐ Aged 65+ years
- ☒ Most deprived

Air pollution category

High



Moderate



Low



Very Low



Drilling down to population susceptibility

Example

- **Pollutant:** PM_{2.5}
- **Health board:** Cardiff & Vale UHB
- **Local Authority:** All
- **Air pollution category:** High (above WHO guideline)
- **Susceptibility:** Most deprived.
- **Results:** In Cardiff, 25.44% of those living in the most polluted areas are of most deprived status.

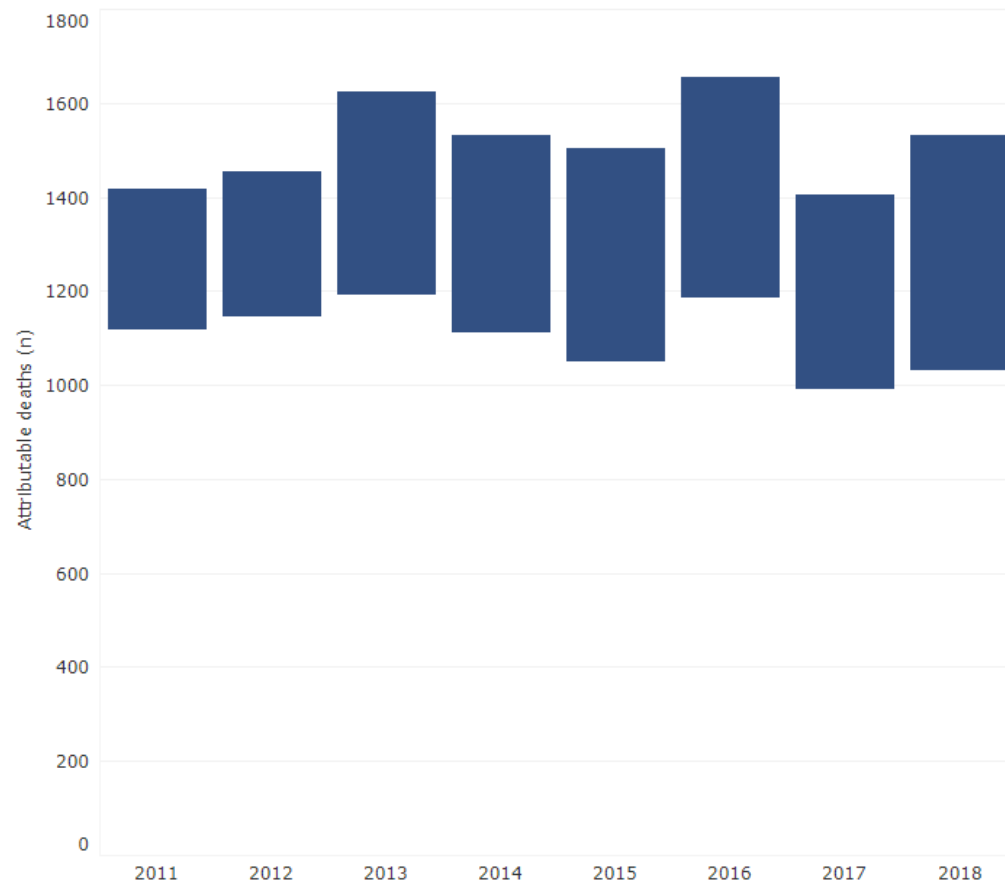
Health effects to long-term air pollution exposure

Home

Health Board

Wales

Mortality burden range attributable to long-term air pollution exposure (Wales)



Filter by health board

Mortality burden estimates are relatively simple calculations that provide a useful 'feel' for the size of the air pollution problem in a given area at a certain point in time. They do, however, require careful interpretation. It is not appropriate to compare estimates between areas as the methods used to derive them use population-weighted annual mean air pollution concentrations which are derived by taking account of area-specific characteristics (such as the proportion of people living in urban vs. rural areas, and the extent to which local air quality is influenced by pollution from more distant sources). It is also not suitable to calculate trends using several years' data in succession because the estimates have no way of accounting for the number of deaths from the year before to influence population ages and size the following year.

Data is displayed according to the health boards in place prior to April 2019. This differs from information presented on other pages within this tool

For the latest year for which data are available (2018), the long-term mortality burden attributable to air pollution (fine particulate matter and nitrogen dioxide combined) is an estimated effect equivalent to 1,030 to 1,531 deaths.

tableau

Navigation icons: back, forward, search, etc.

Thank you

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