

Environment and Health (Outdoor Air Pollution)

West Midlands Public Health Observatory

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Introduction

- What is pollution?
- Why is air important?
- What is the relationship with health?
- Particulate Matter and other air pollutants
- Mortality and Admissions data
- Conclusion

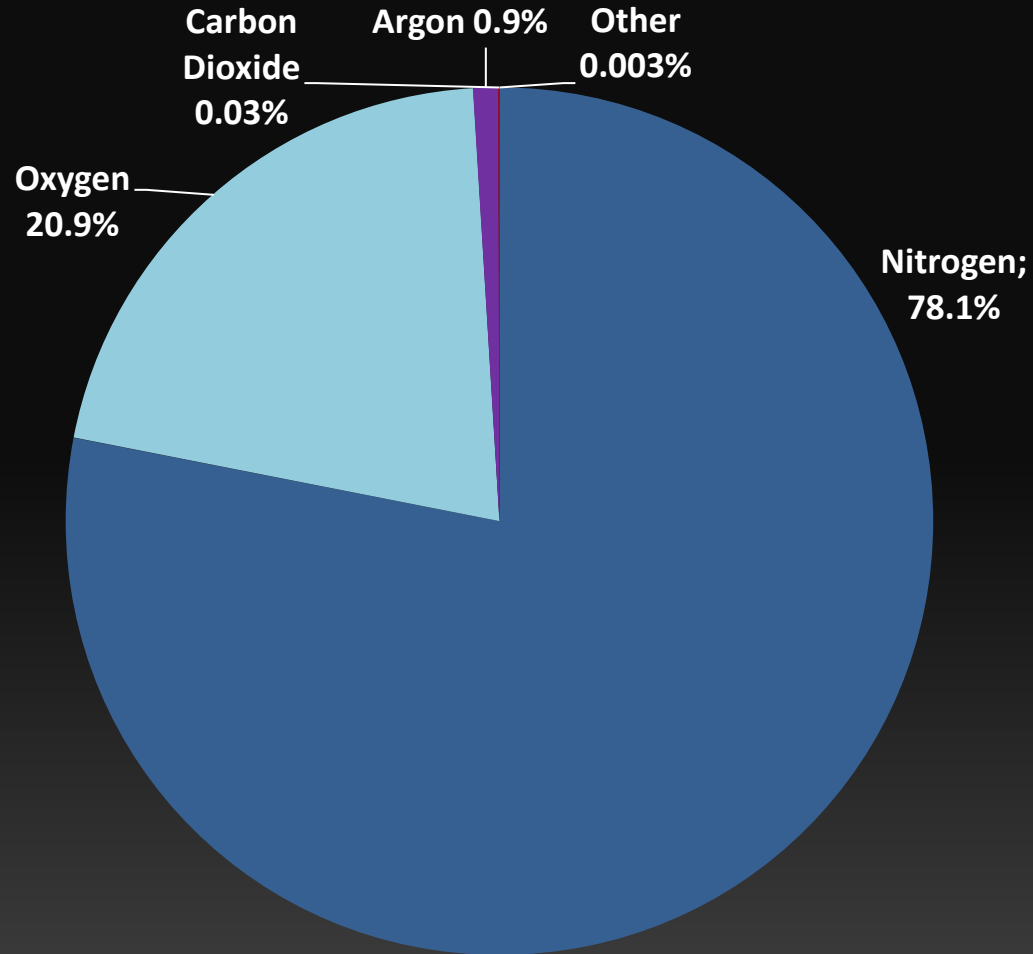
What is pollution?

*“the **addition** of any **substance** or form of energy (e.g., heat, sound, radioactivity) to the **environment at a rate faster than the environment can accommodate it by dispersion, breakdown, recycling, or storage in some harmless form**” (Encyclopaedia Britannica)*

Air



What is air?



Human Respiration



- Exhale
 - 14% oxygen
 - 4.4% carbon dioxide.
- If O₂ in atmosphere is
 - <19.5% can lead to adverse physiological effects
 - <16% can become life threatening.

Air pollution and health

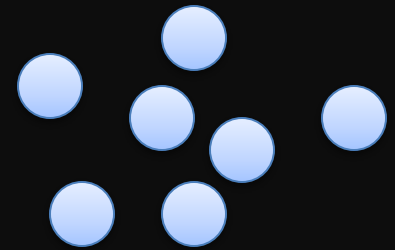
- The WHO estimates that 2 million deaths a year are from causes directly attributable to indoor and outdoor air pollution.
- Individuals have little control over the air they breathe

Ozone and PM₁₀

- DEFRA report that daily peak ozone levels and long term exposure to particulate matter have the greatest impacts on health.

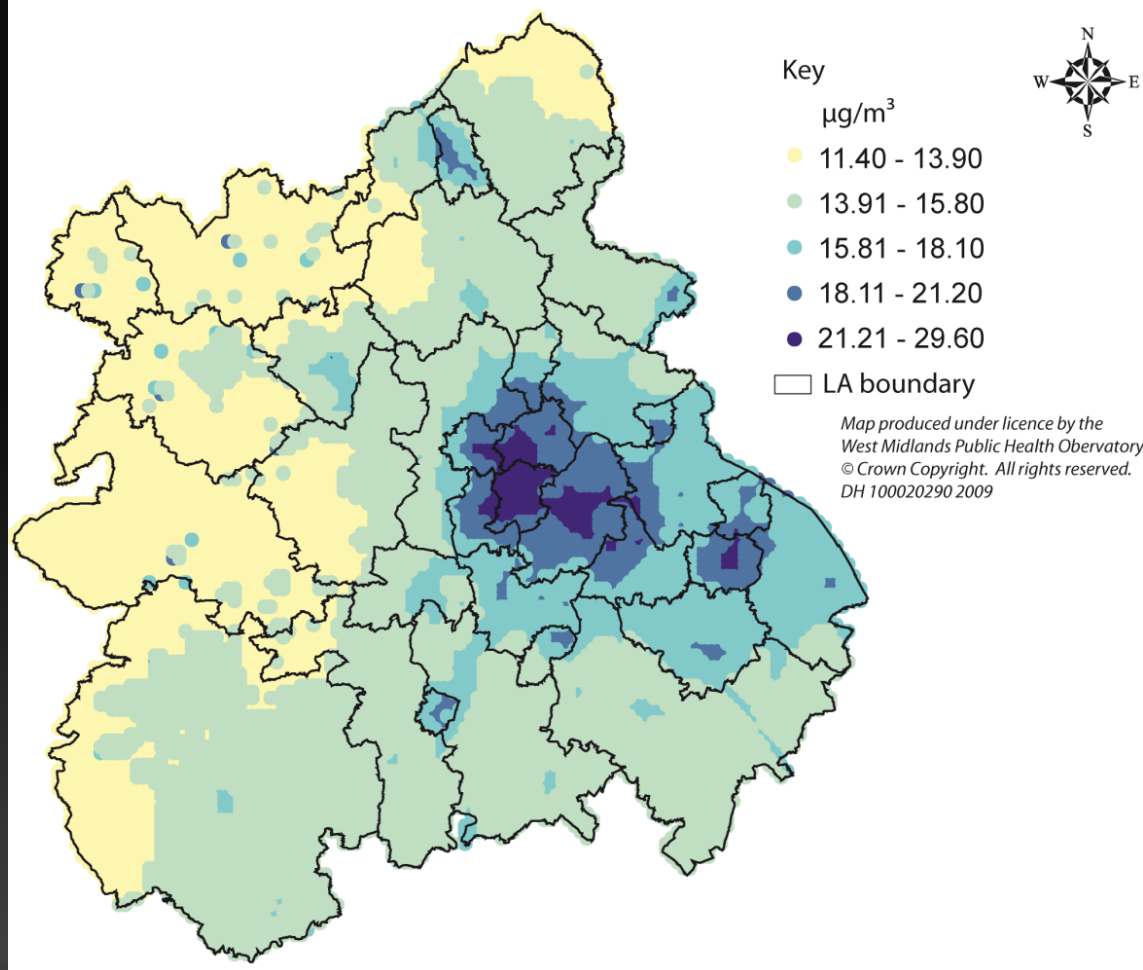
Particulate matter (PM_{10})

- Airborne liquid or solid particles from a variety of sources
- PM_{10} – less than $10\mu g$
- PM from combustion processes



Map of annual mean PM₁₀ concentrations in 2008 within LA areas of the West Midlands

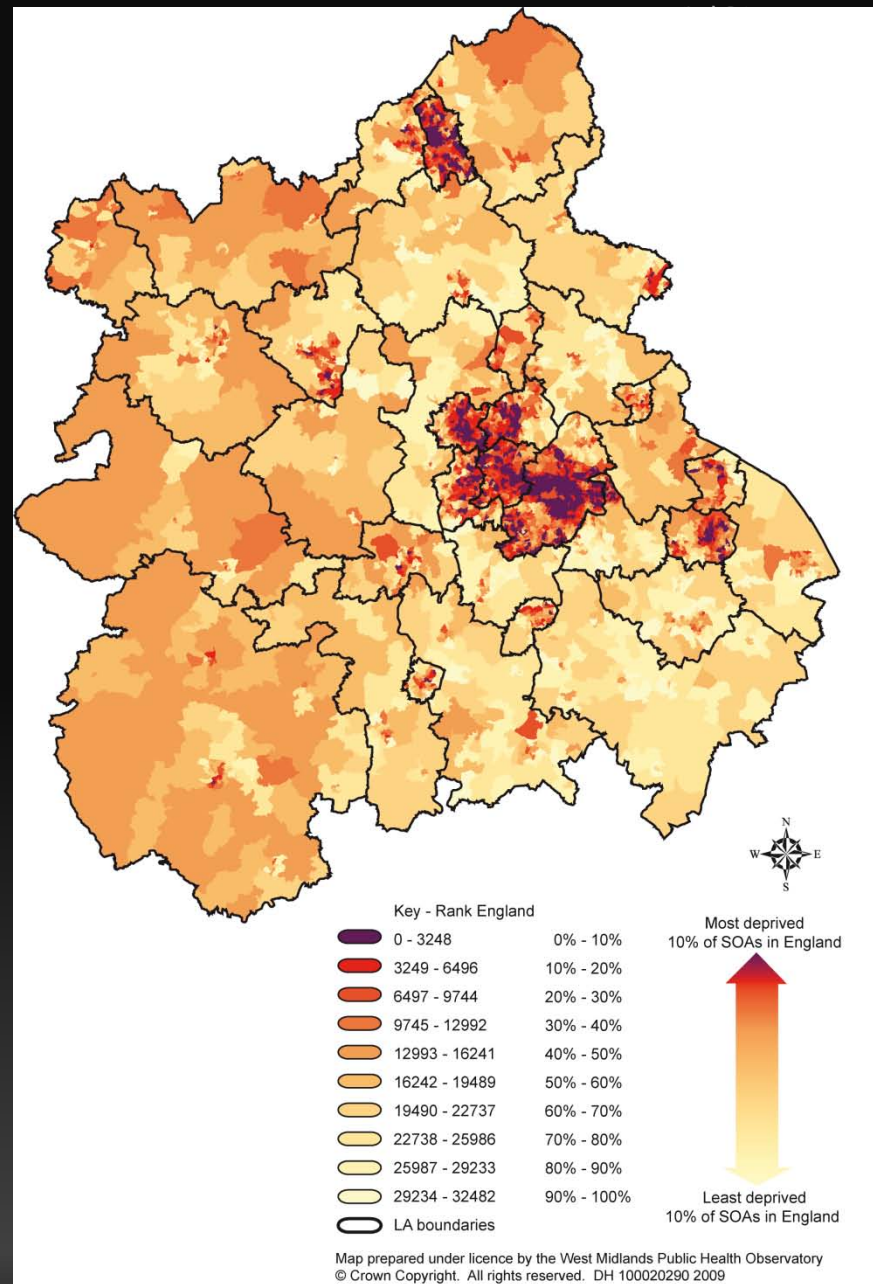
Estimated Background Air Pollution - Annual mean concentrations of PM₁₀.



Reduction in PM₁₀ from 70 to 20µg/m³ could mean 15% less deaths! (WHO)

Source: UK air quality archive

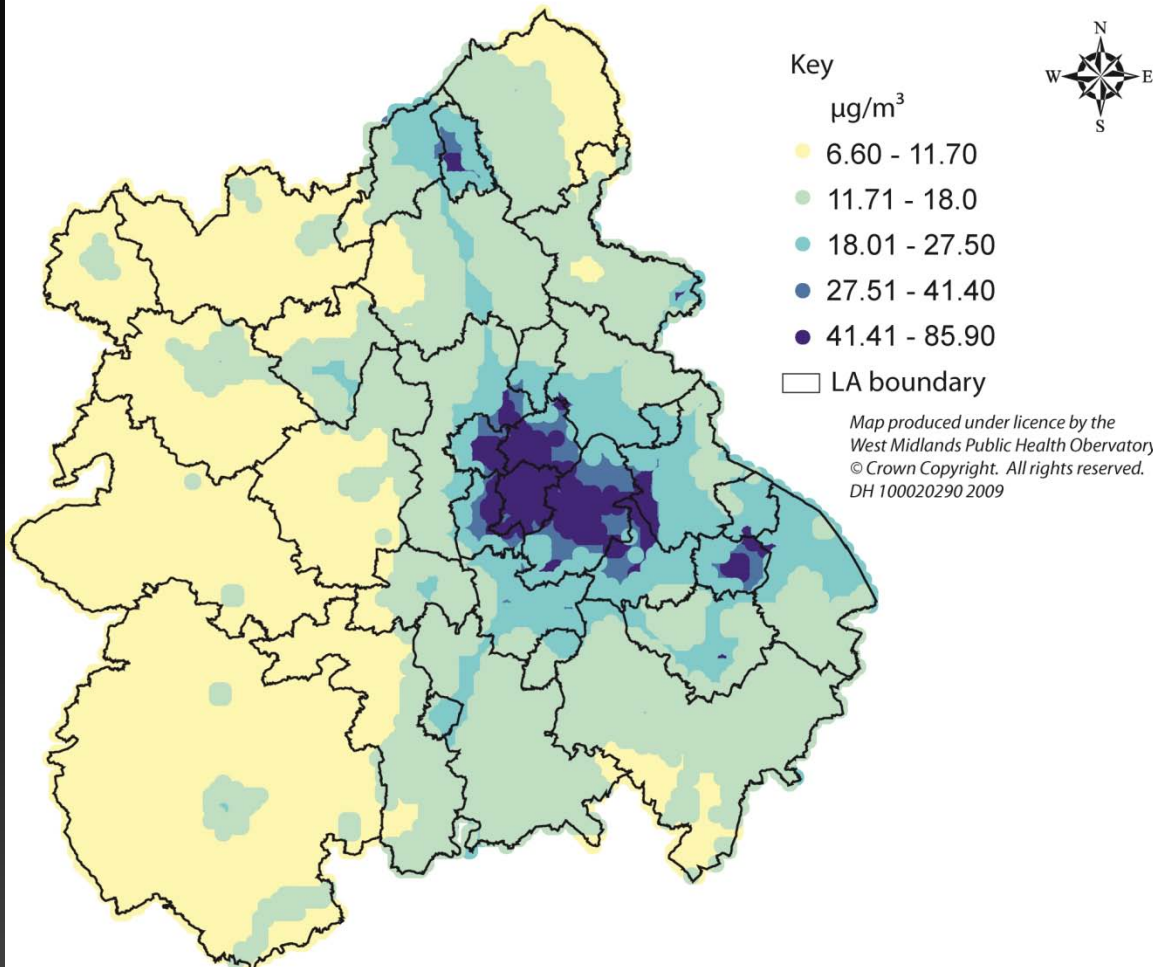
Overall Deprivation



Source: DCLG

Nitrogen Oxides

Estimated Background Air Pollution - Annual mean concentrations of NOx



NOx + air = ozone and smog

Source: UK air quality archive

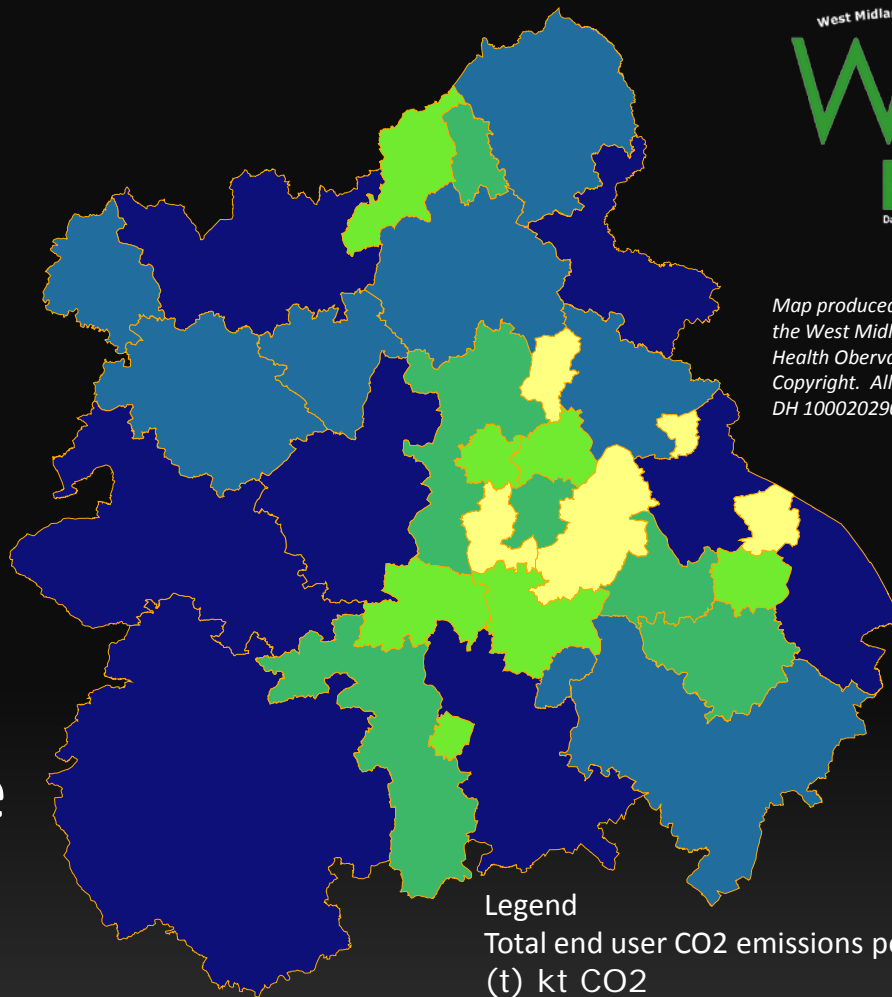
Ozone

- WHO estimate that 21,000 premature deaths are caused each year in Europe from causes attributable to ozone pollution

Carbon Dioxide

NI 186 – Per capita CO₂ emissions
in the LA area

- Increases in CO₂ can lead to increases in air temperature
- As little as 1°C rise could lead to 20,000 excess deaths globally



Legend

Total end user CO₂ emissions per capita
(t) kt CO₂

5.37 – 6.02

6.03 – 6.61

6.62 – 7.60

7.61 – 8.48

8.49 – 11.2

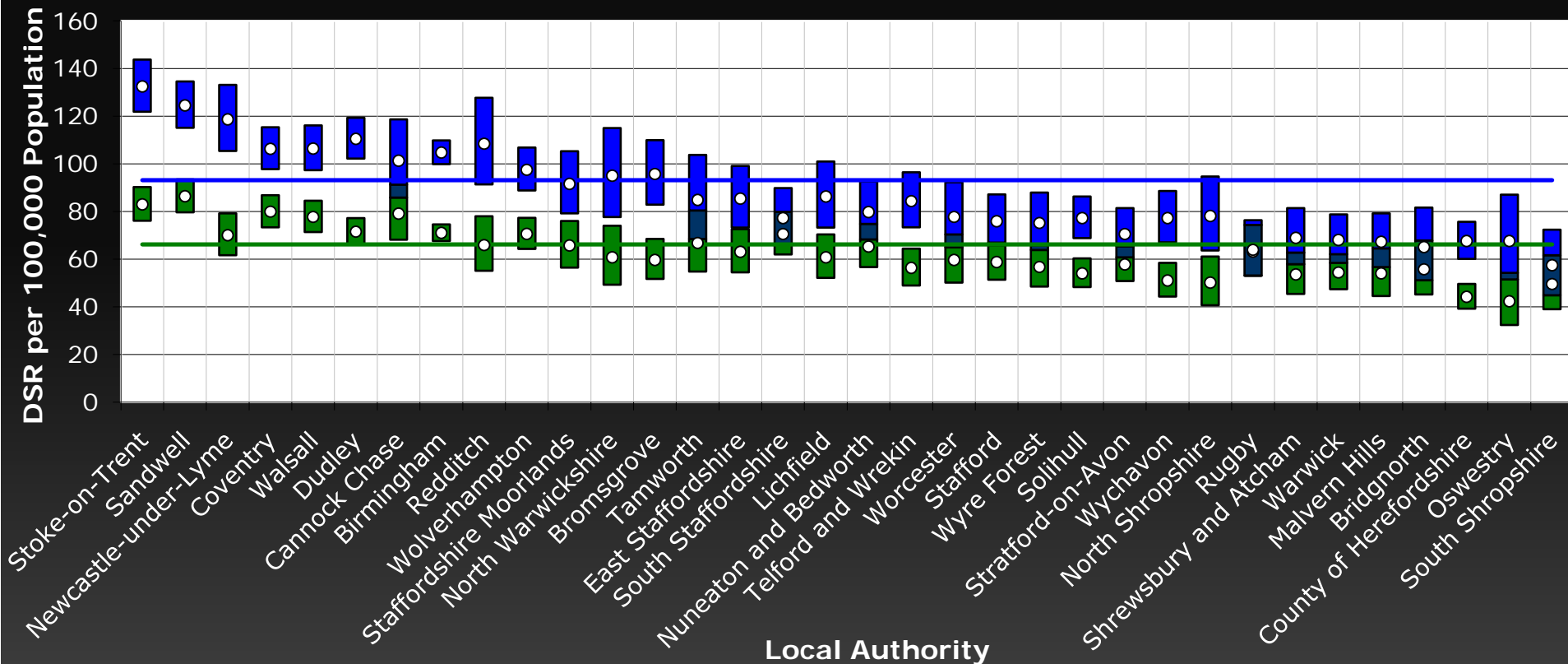
Source: DEFRA

Mortality and admissions data

- COMEAP estimate 8,100 excess deaths per year in GB that can be attributed to PM₁₀ pollution – largely in the elderly or already sick

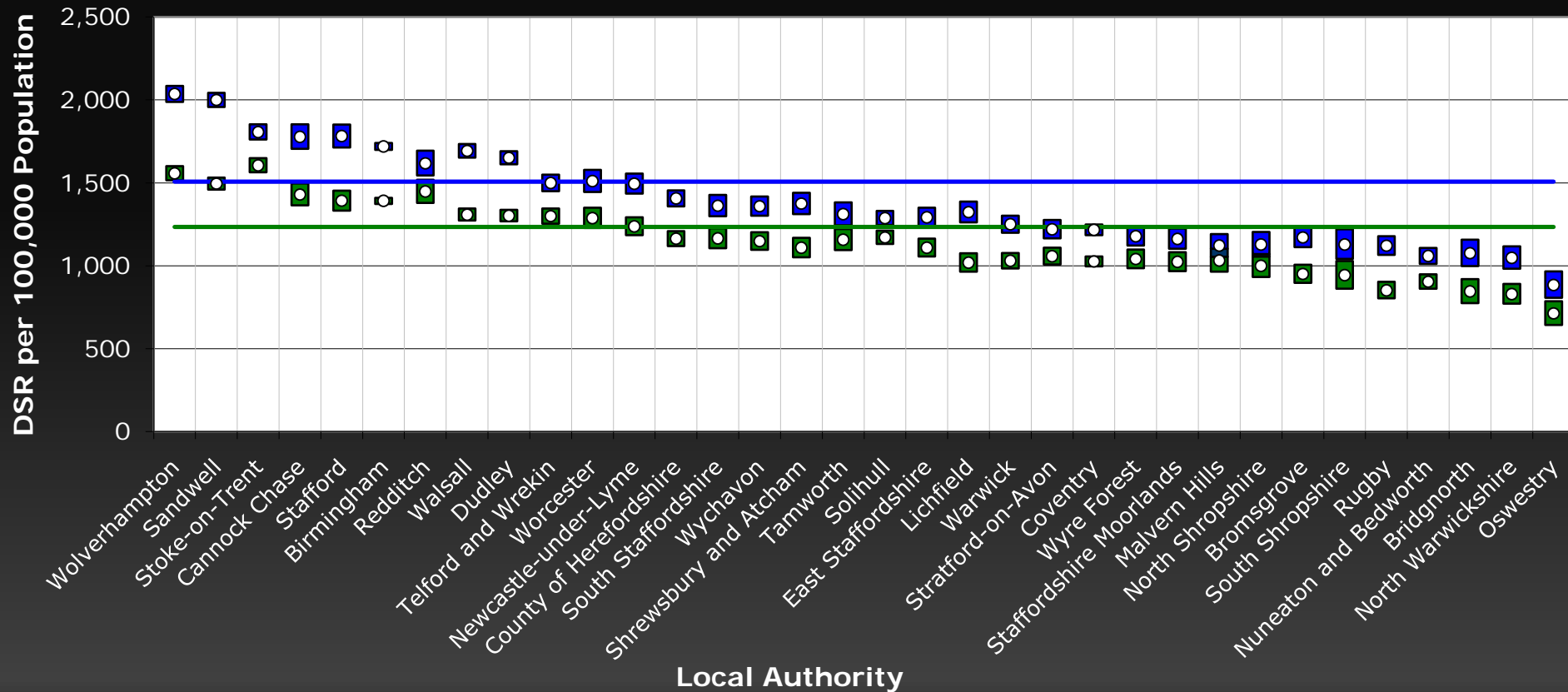
DSRs of mortality for Diseases of the Respiratory System, LA, 2005-07 pooled

Figure 7.1: Directly Standardised Mortality rates for Diseases of the Respiratory System (ICD10 J00-J99), by Local Authority, All Ages, 2005-2007 pooled



DSRs of admissions for Diseases of the Respiratory System, LA 2005-07 pooled

Figure 7.2: Directly Standardised Admission rates for Diseases of the Respiratory System (ICD10 J00-J99), by Local Authority, All Ages, 2005-2007 pooled



Conclusion

In the West Midlands air pollution and poor respiratory health tend to be found in similar places....

...however these places also have other characteristics in common such as high deprivation scores so it does not necessarily follow that air pollution causes the ill health.

None the less there is a strong health argument for reducing air pollution.