Climate Emergency – the impact on health and air quality

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North Tyneside Council

- Overview of the evidence on harms to health as a result of exposure to poor air quality (Particulates and NO2)
- Overview of the current population level exposure to PM2.5 and NO2
- Prevalence of circulatory and respiratory disease and cancer and associated mortality

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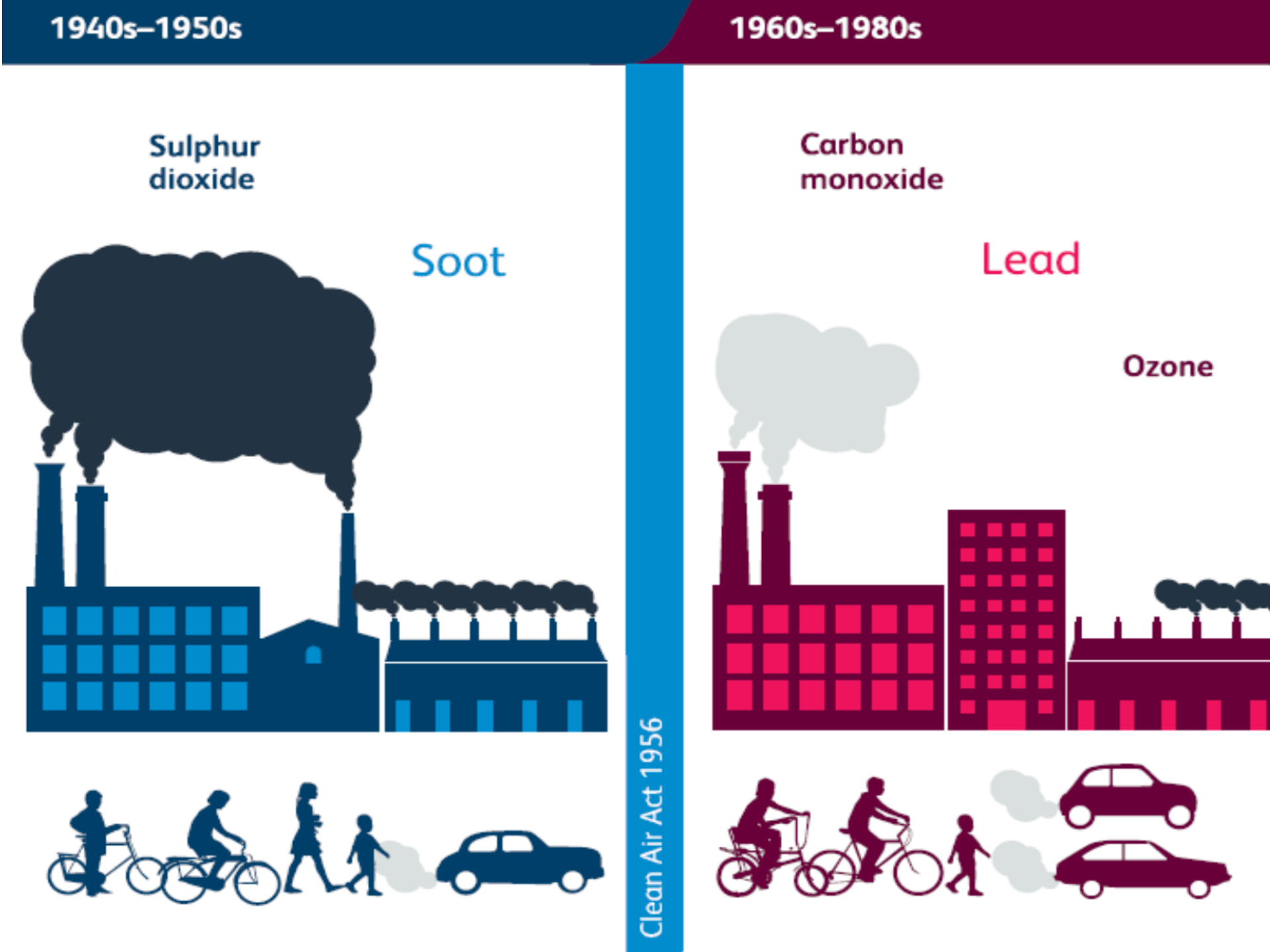

1940s–1950s
1960s–1980s
Sulphur dioxide
Soot
Carbon monoxide
Lead
Ozone
Clean Air Act 1956

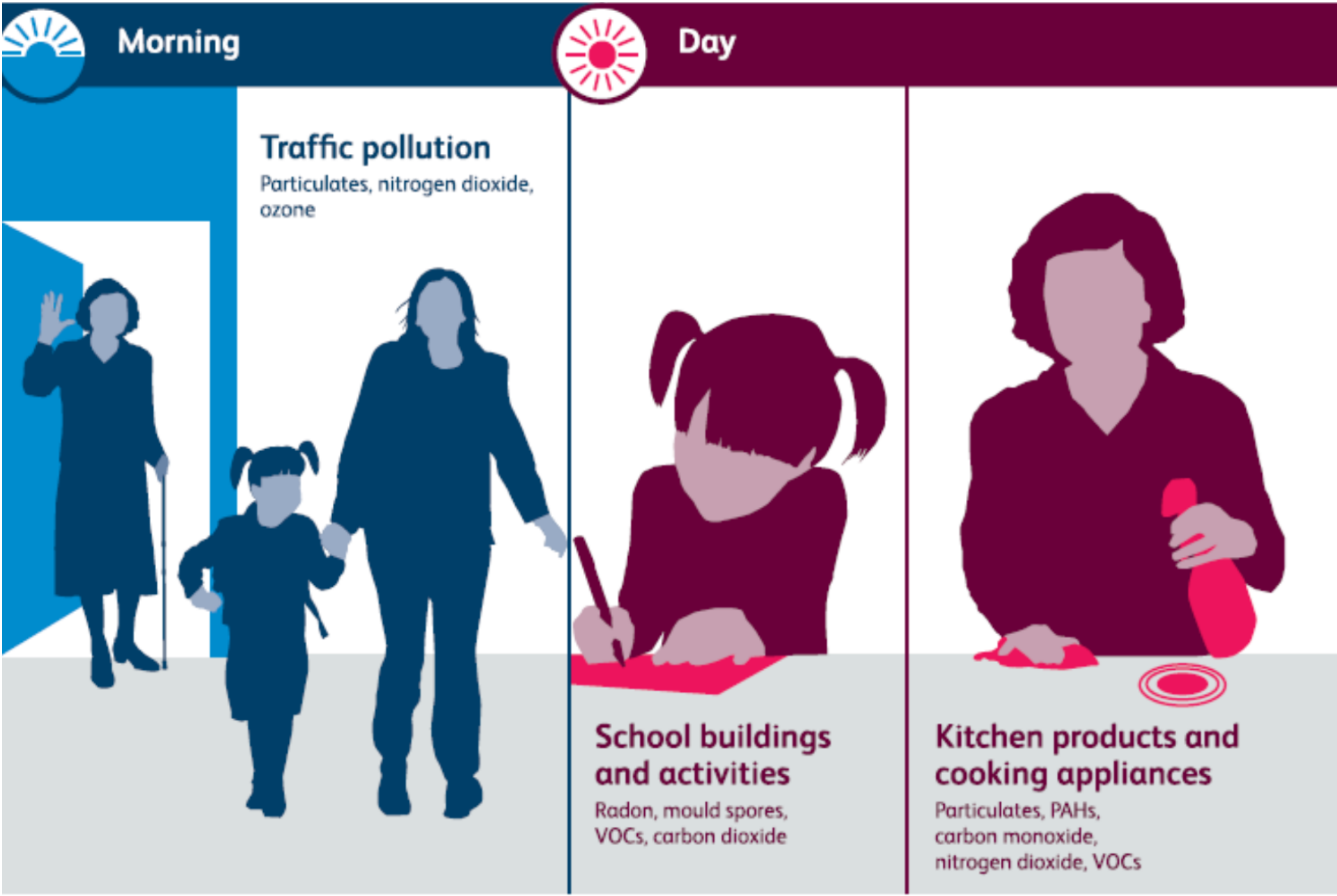
Across this period in time:

Lead in fuel restricted 1998

Nitrogen dioxide

Particulates

Situational exposure to poor air quality

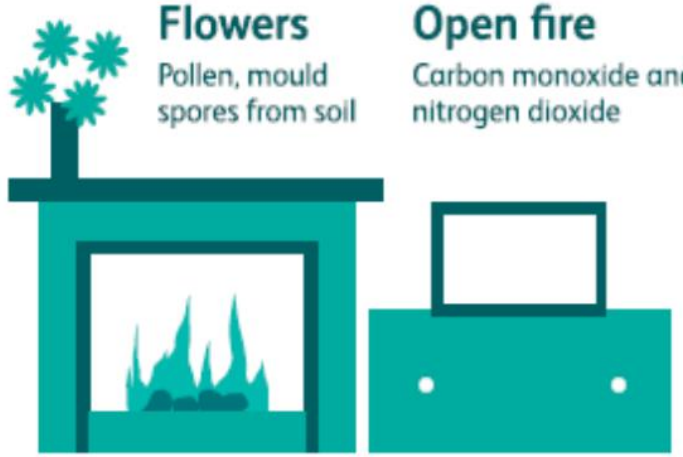


Situational exposure to poor air quality

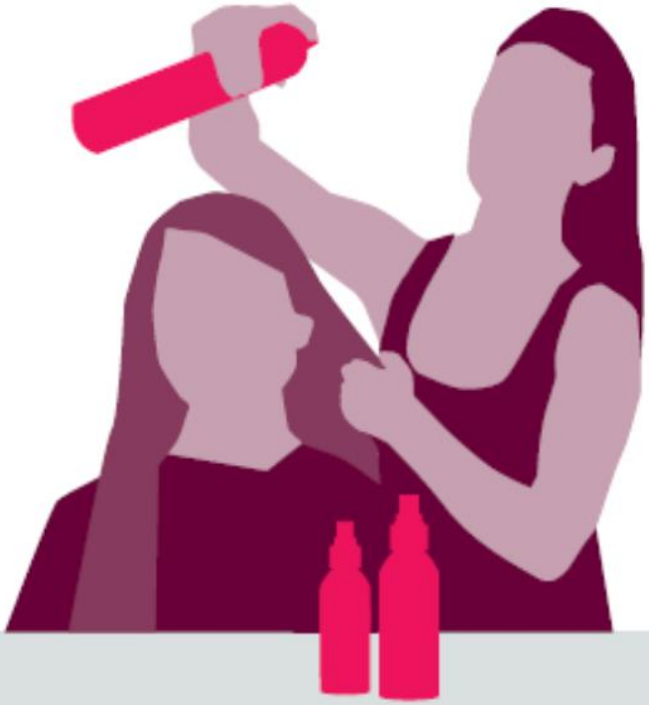
Evening/night

Flowers
Pollen, mould spores from soil

Open fire
Carbon monoxide and nitrogen dioxide



Cigarette smoke
Hundreds of hazardous compounds

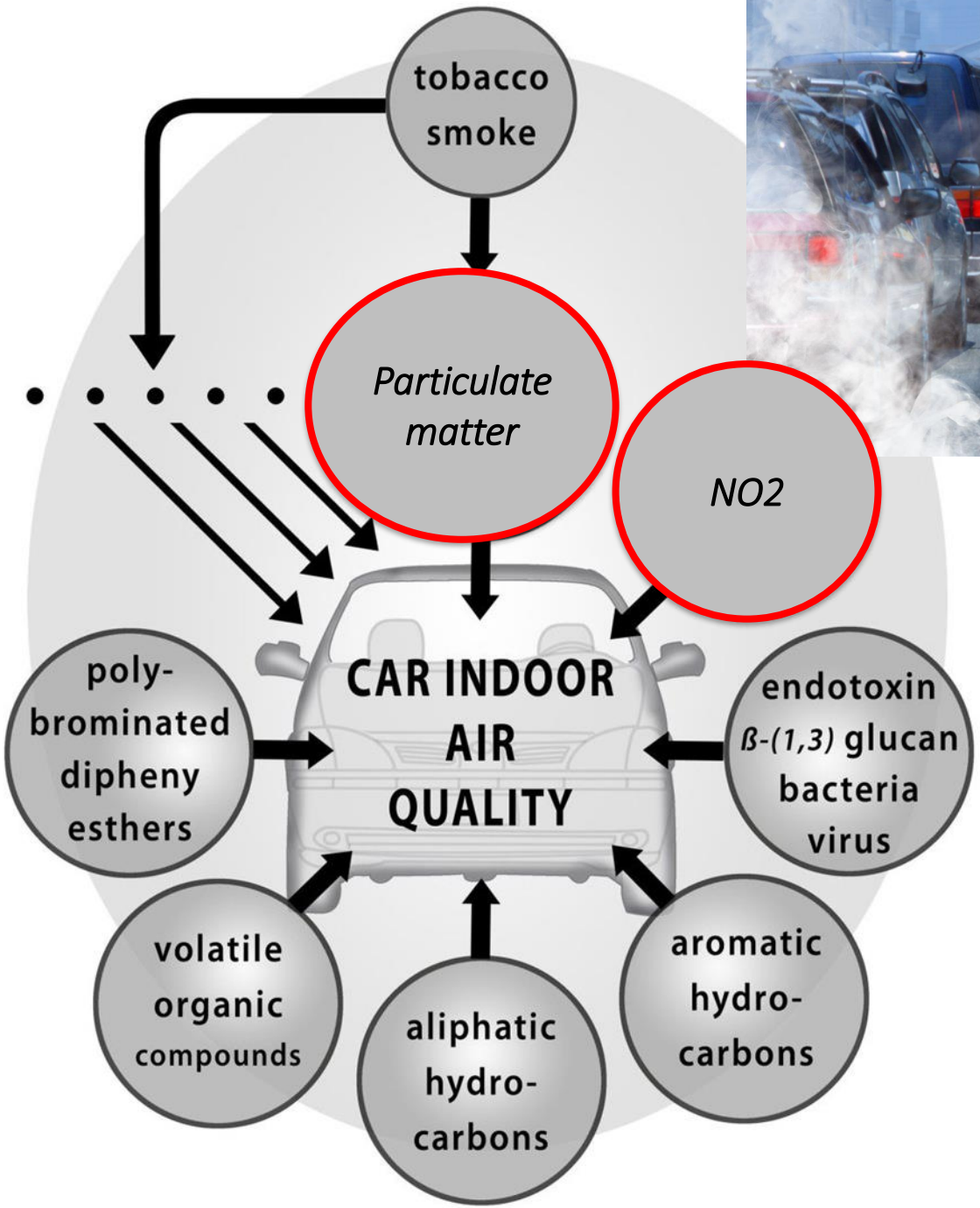


Personal care products
VOCs

Cat
Dander

Carpets and sofa cushions
House-dust mites, VOCs

Vapours from chipboard furniture
Formaldehyde



Air quality inside the car is generally worse than outside…

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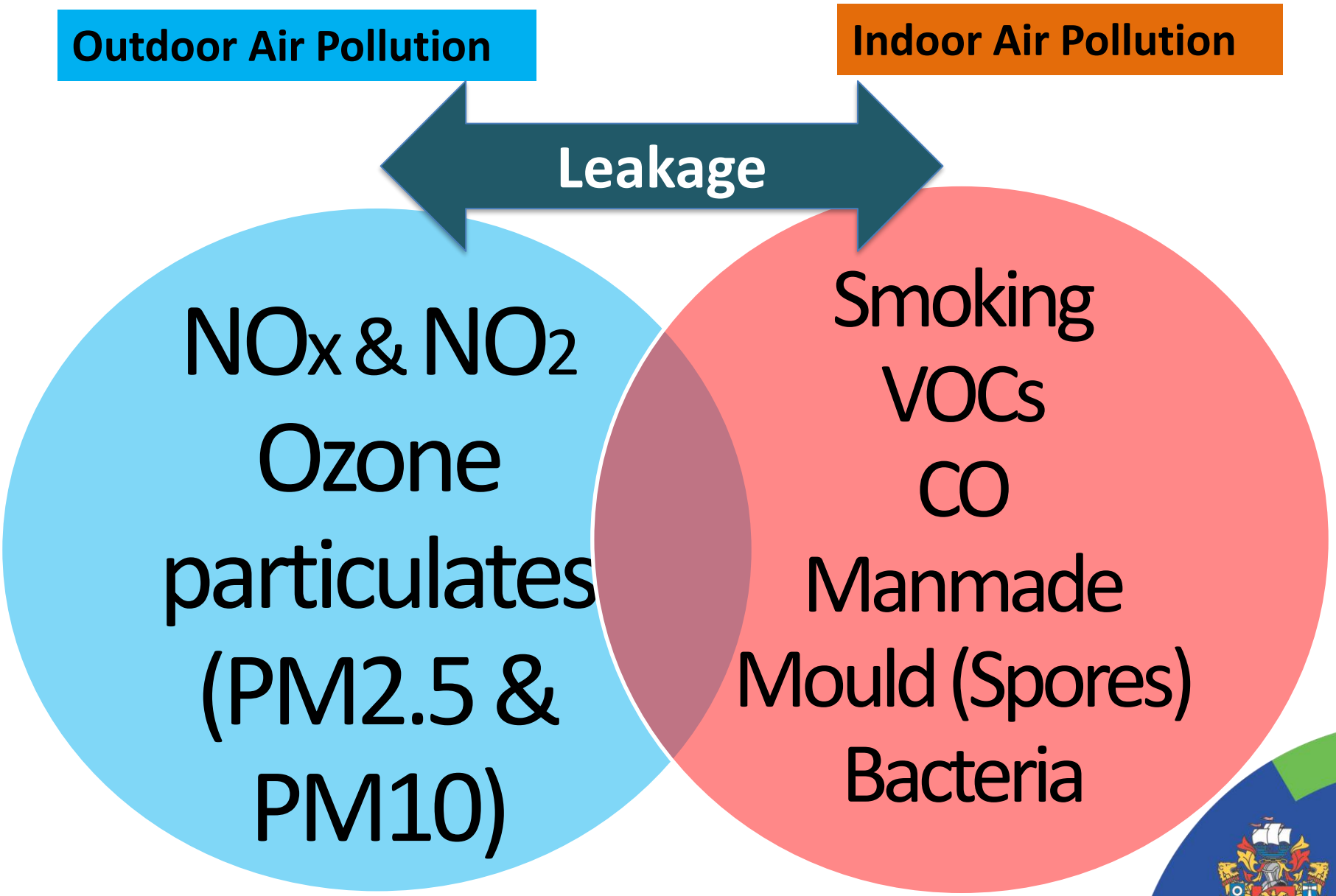

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$PM_{2.5}$

SOURCES

Domestic wood & coal burning	38%*
Industrial combustion	16%*
Road transport	12%*
Use of solvents & industrial processes	13%*

NO_2

SOURCES

Road transport	34%*
Near roadsides	80%
Energy generation	22%*
Domestic & Industrial combustion	19%*
Other transport	17%*

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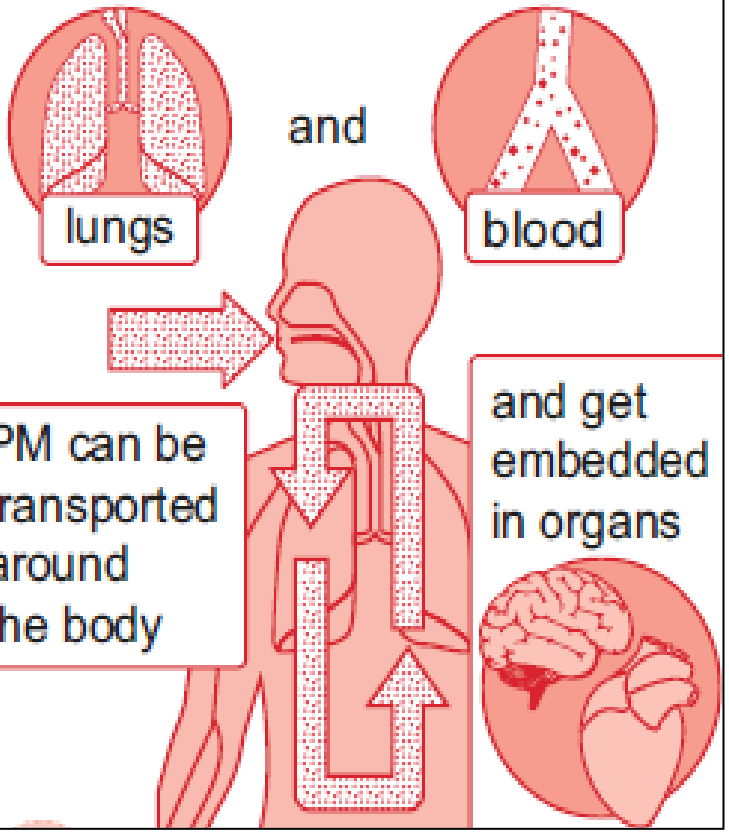
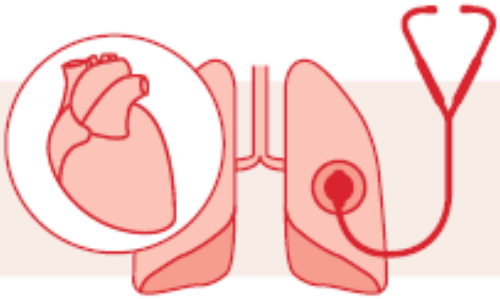
IMPACTS

These tiny particles from smoke, soot and dust can get into the...



More likely to be affected are:

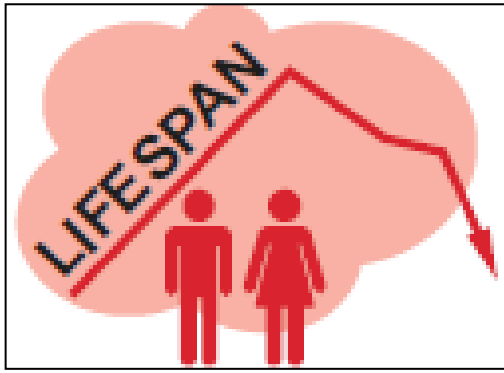
those already suffering from lung and heart conditions



elderly people

pregnant woman and their unborn babies

and the very young



$PM_{2.5}$ can shorten lifespans

Primary Particulate Matter ($PM_{2.5}$)

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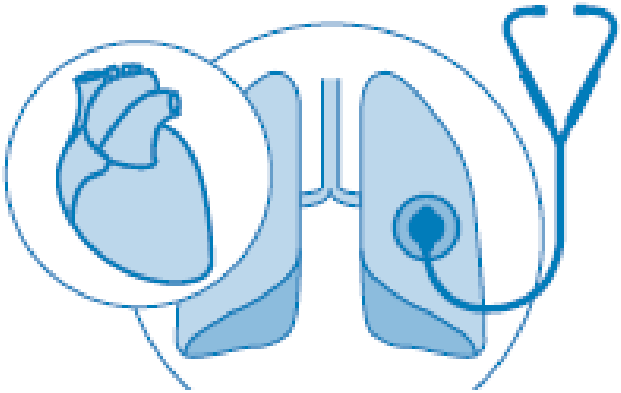
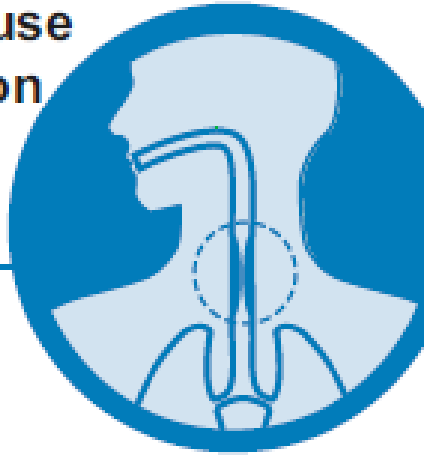


Exacerbates symptoms

of those already suffering from lung or heart conditions shortening lives and reducing quality of life

Short-term exposure to high concentrations of NO_2 can cause inflammation of the airways



INCREASES susceptibility:

- respiratory infections
- allergens

NOx REACT with **other pollutants** → **ground level ozone O_3**

Nitrogen oxides (NO_x)

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	Long term exposure to PM2.5	Long term exposure to NO2
Stronger evidence of association	Coronary heart disease Stroke Lung Cancer Asthma (Children)	Asthma (Children)
Evidence **less certain** or the evidence is **emerging**	Chronic Obstructive Pulmonary disease (as chronic bronchitis) Diabetes Low Birth Weight	Asthma (Adults) Diabetes Lung Cancer Low Birth Weight Dementia

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Air Quality Measures

- **PM2.5 (NO SAFE LIMIT)**

EU Air Quality Directive - annual mean objective of **25µg/m-3**

PHE annual mean exposure of **>12.3µg/m-3** threshold harms health

WHO annual mean objective of **10µg/m-3**

- **NO2**

EU Air Quality Directive and WHO - annual mean objective is **40µg/m-3**

PHE - annual mean exposure of **>20.5µg/m-3** threshold harms health

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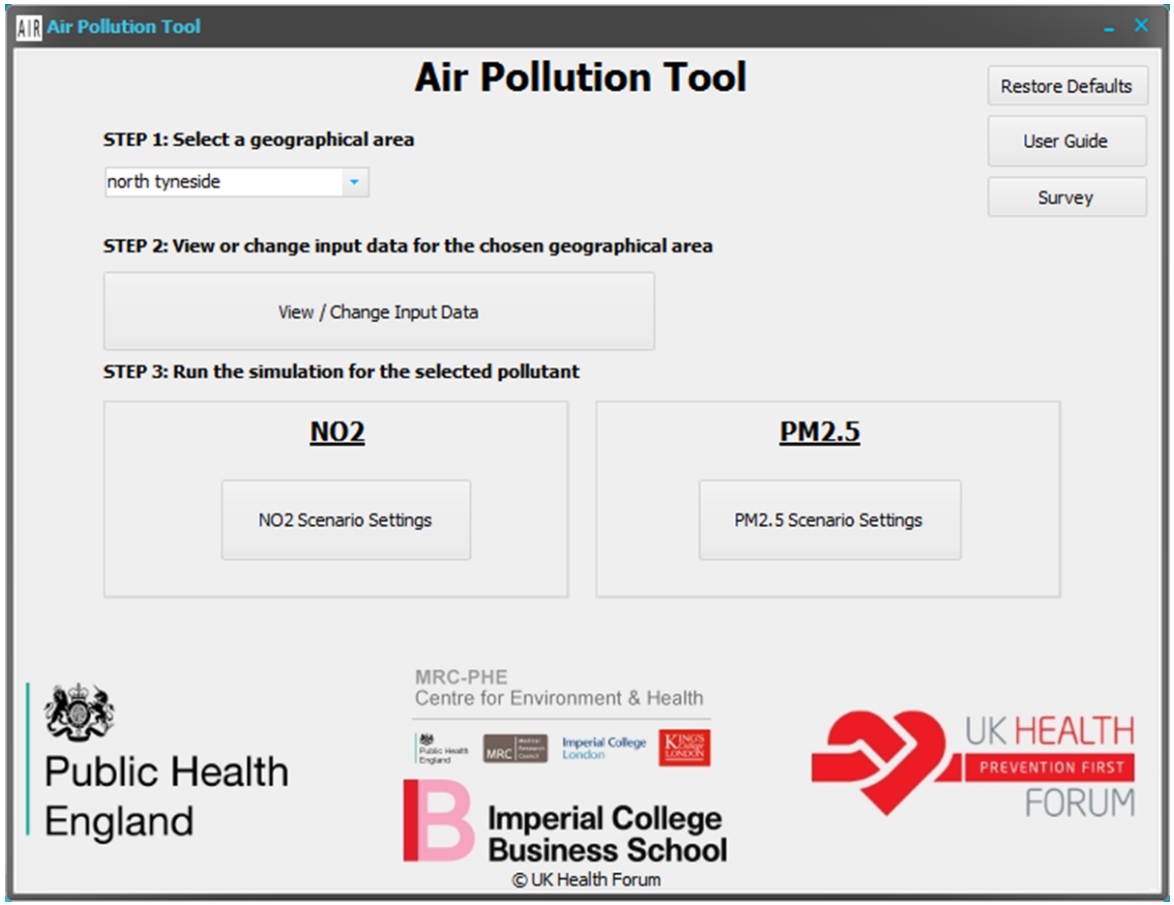

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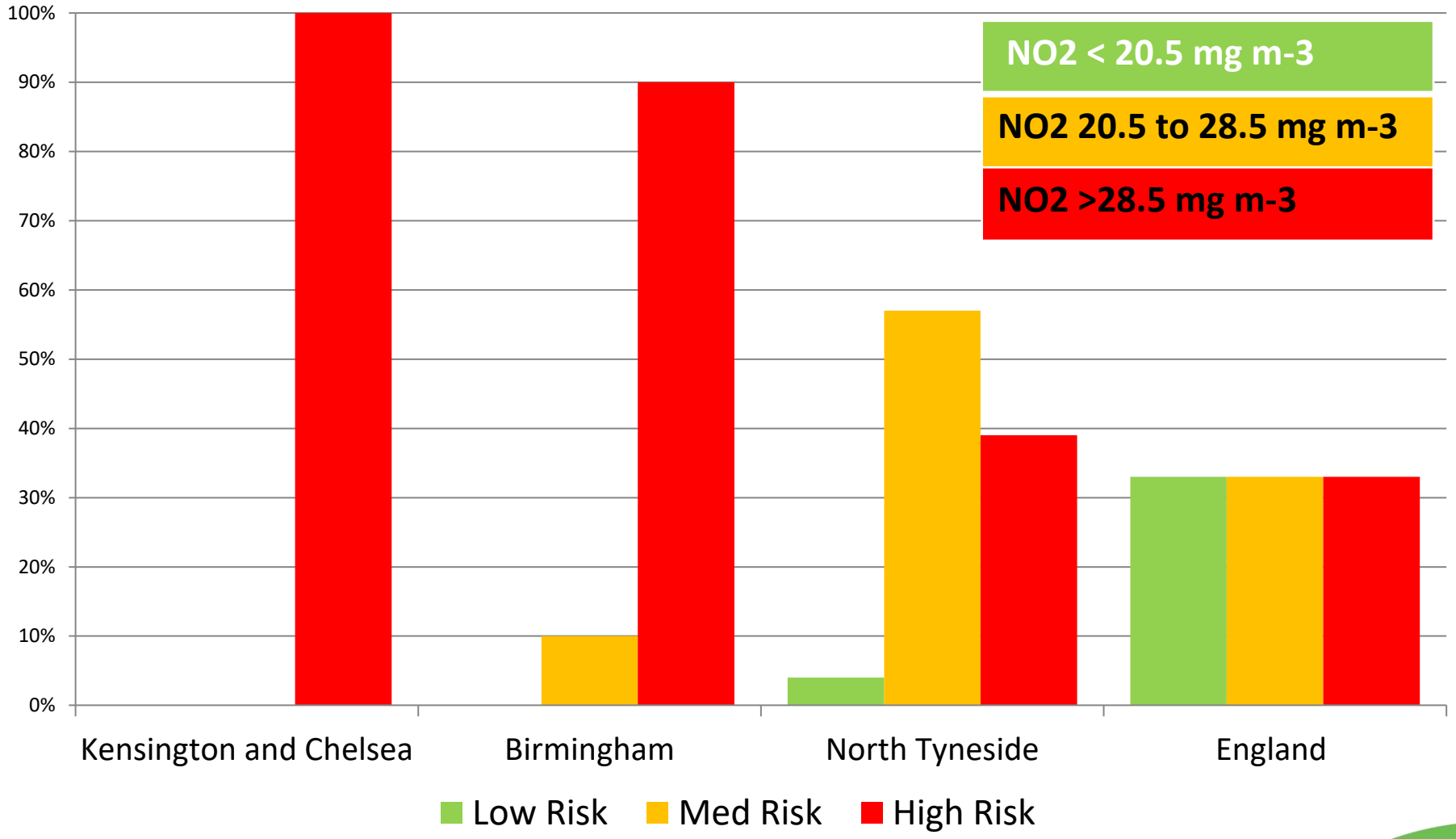

North Tyneside Population exposure to NO2 – harms on health

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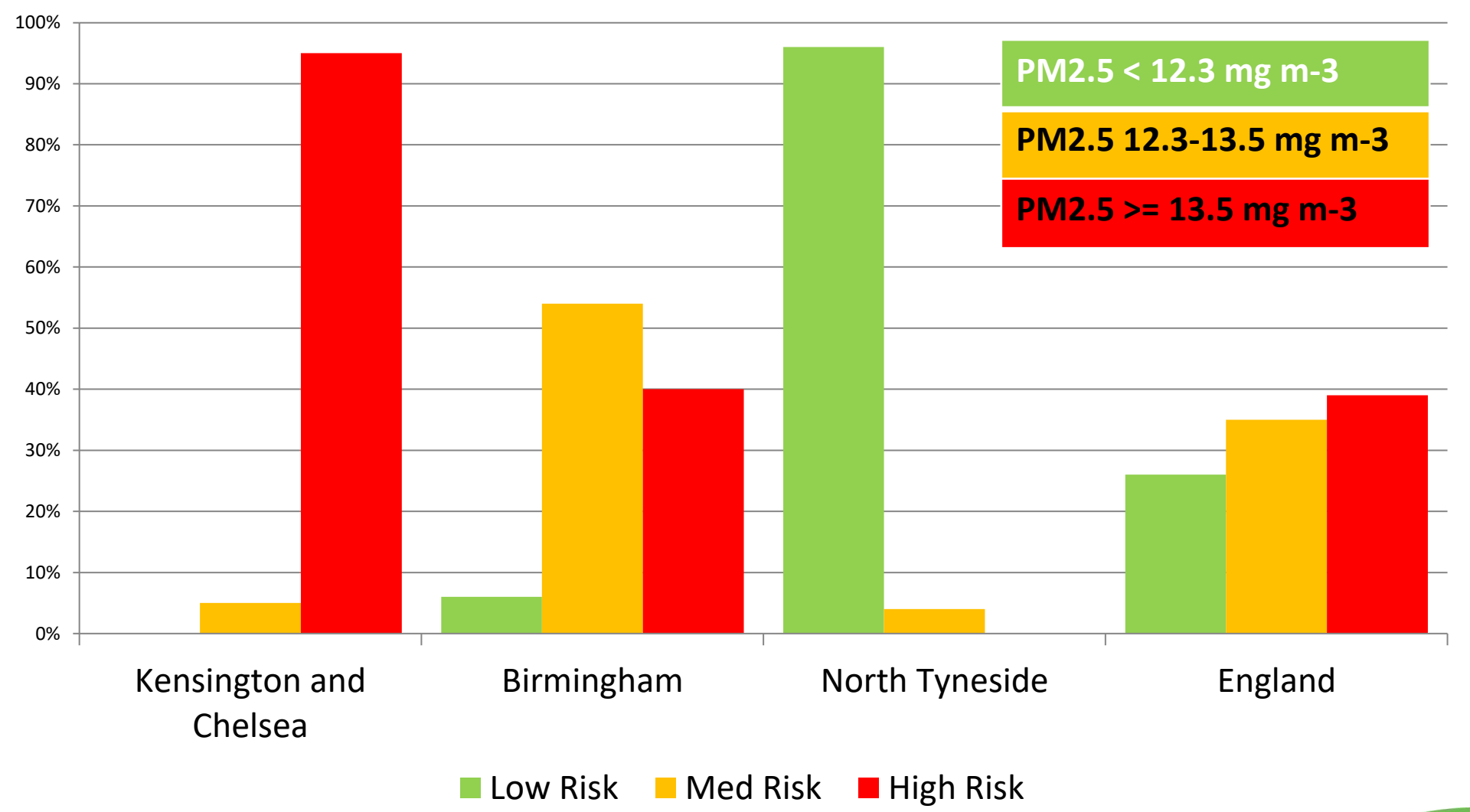

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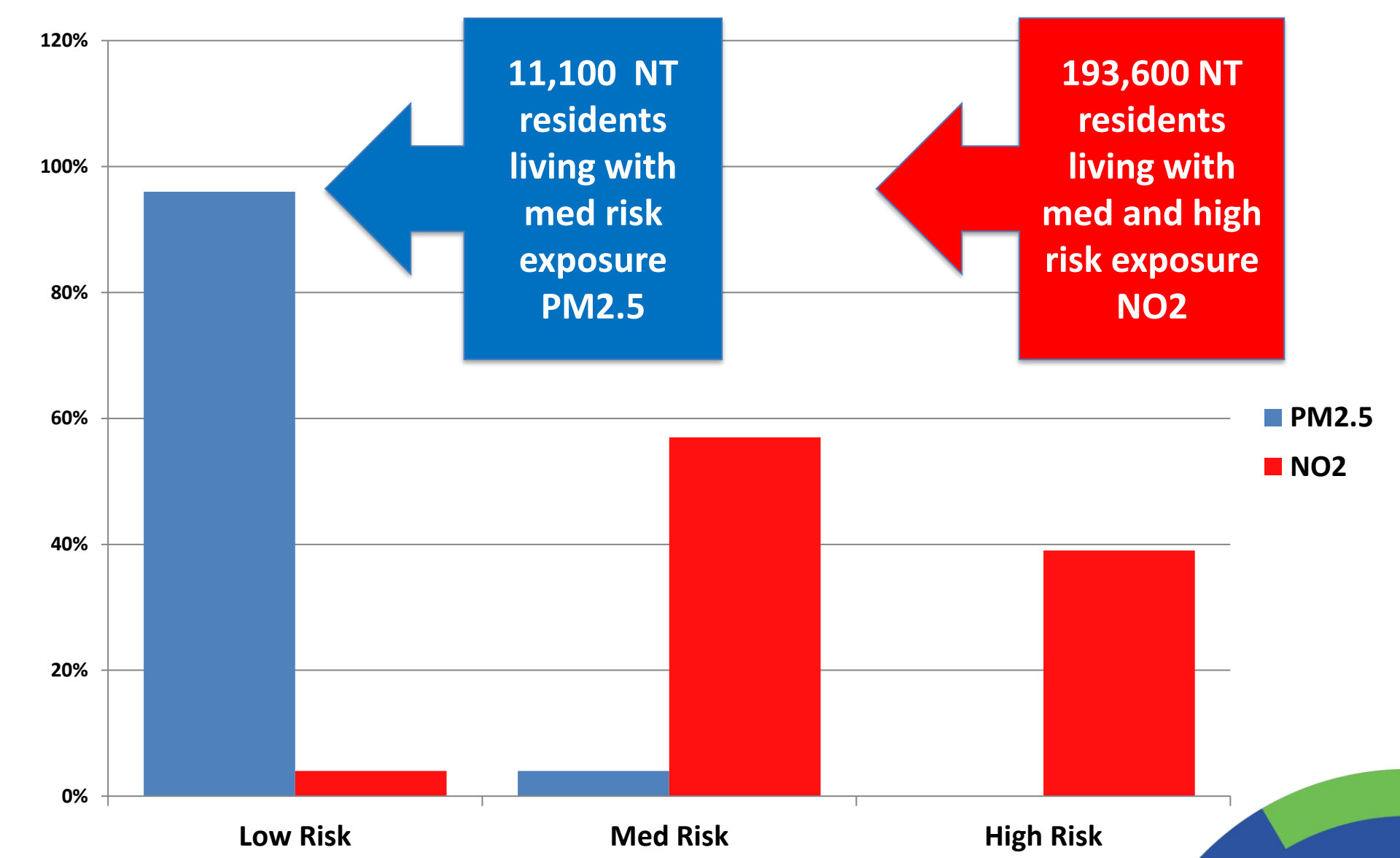

North Tyneside shifting the population exposure from harmful levels of NO2 and PM2.5

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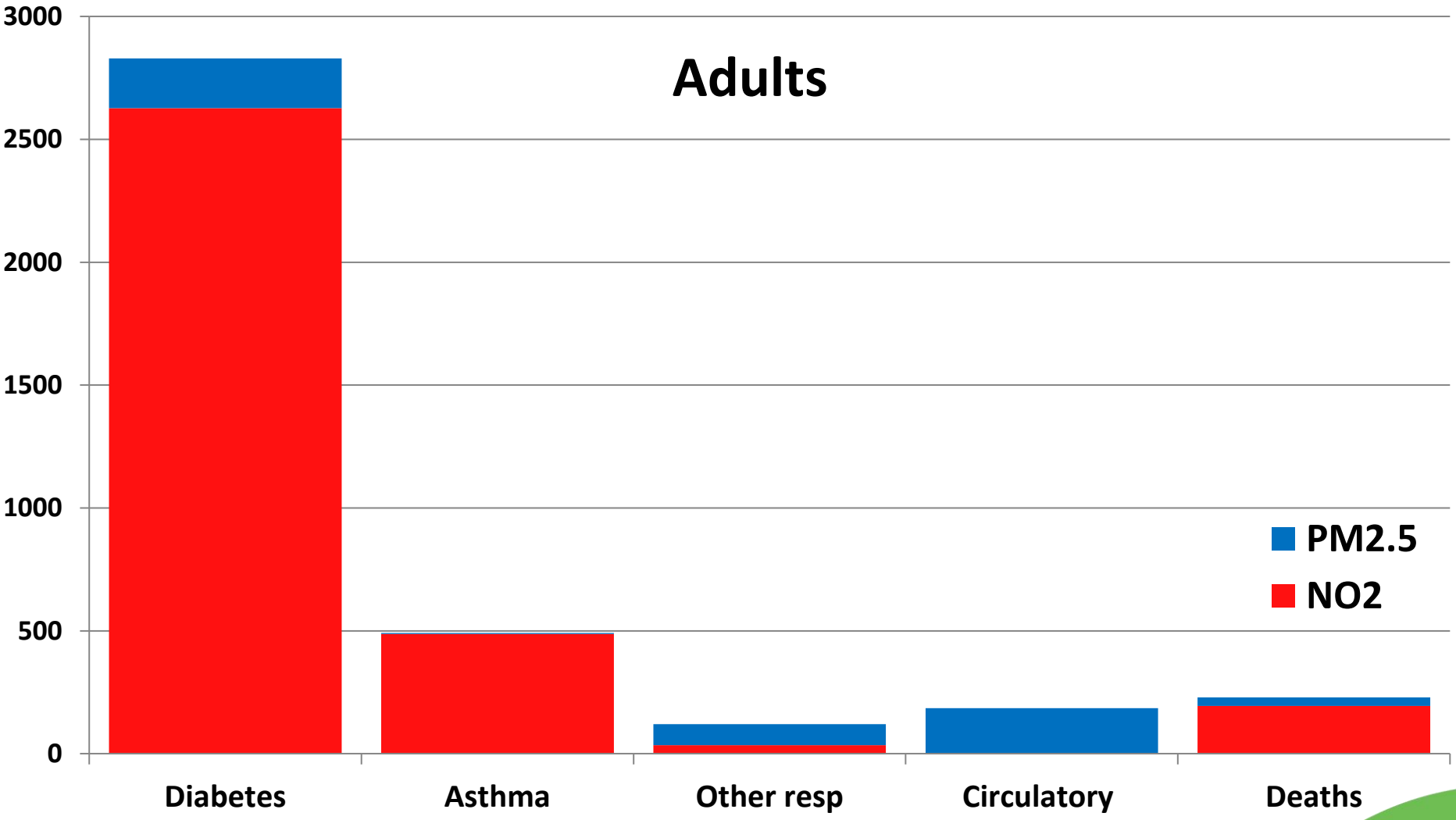

Burden of disease and mortality that could be prevented 2019 - 2030 by adjusting the population exposure in North Tyneside to low risk

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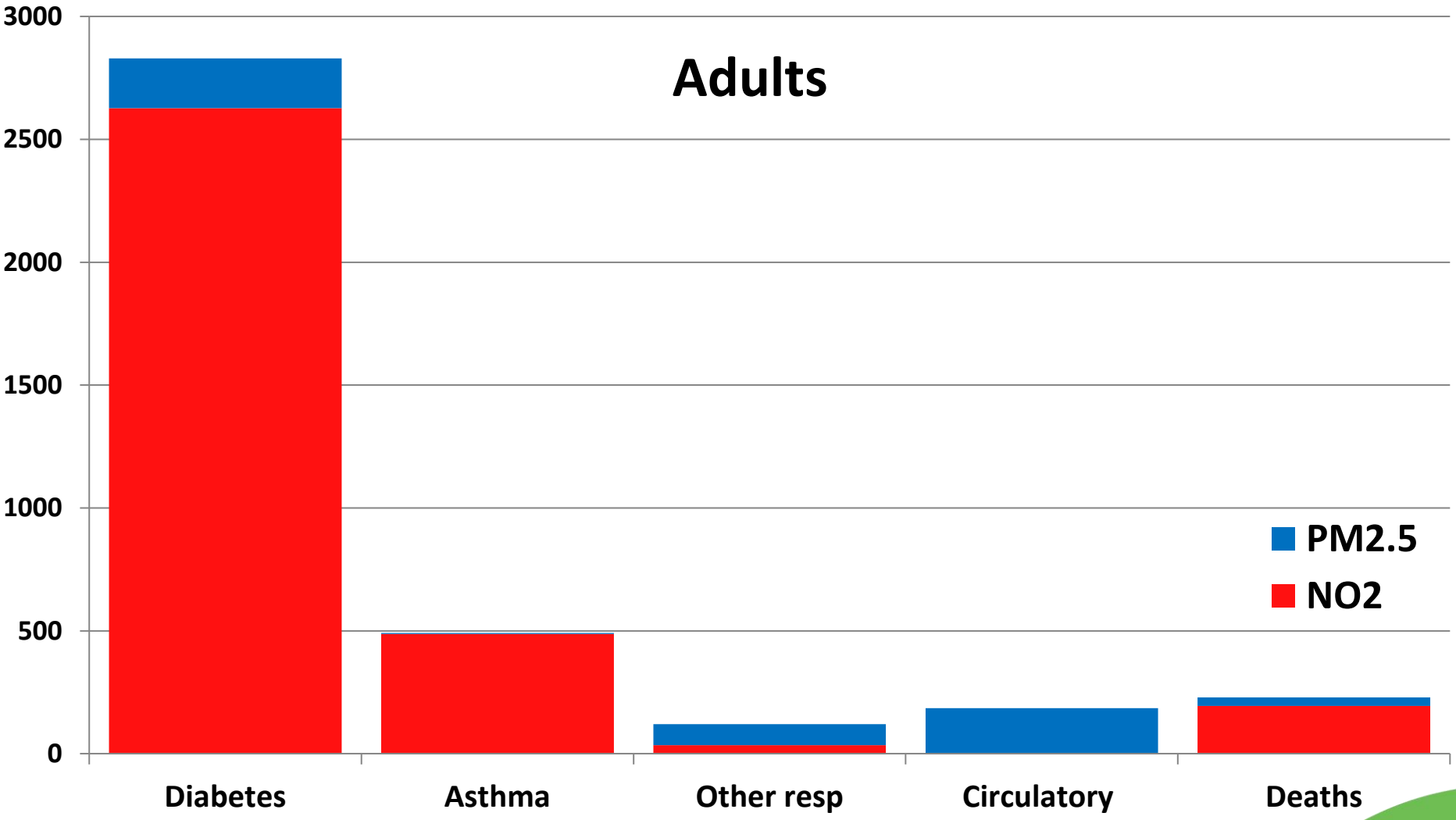

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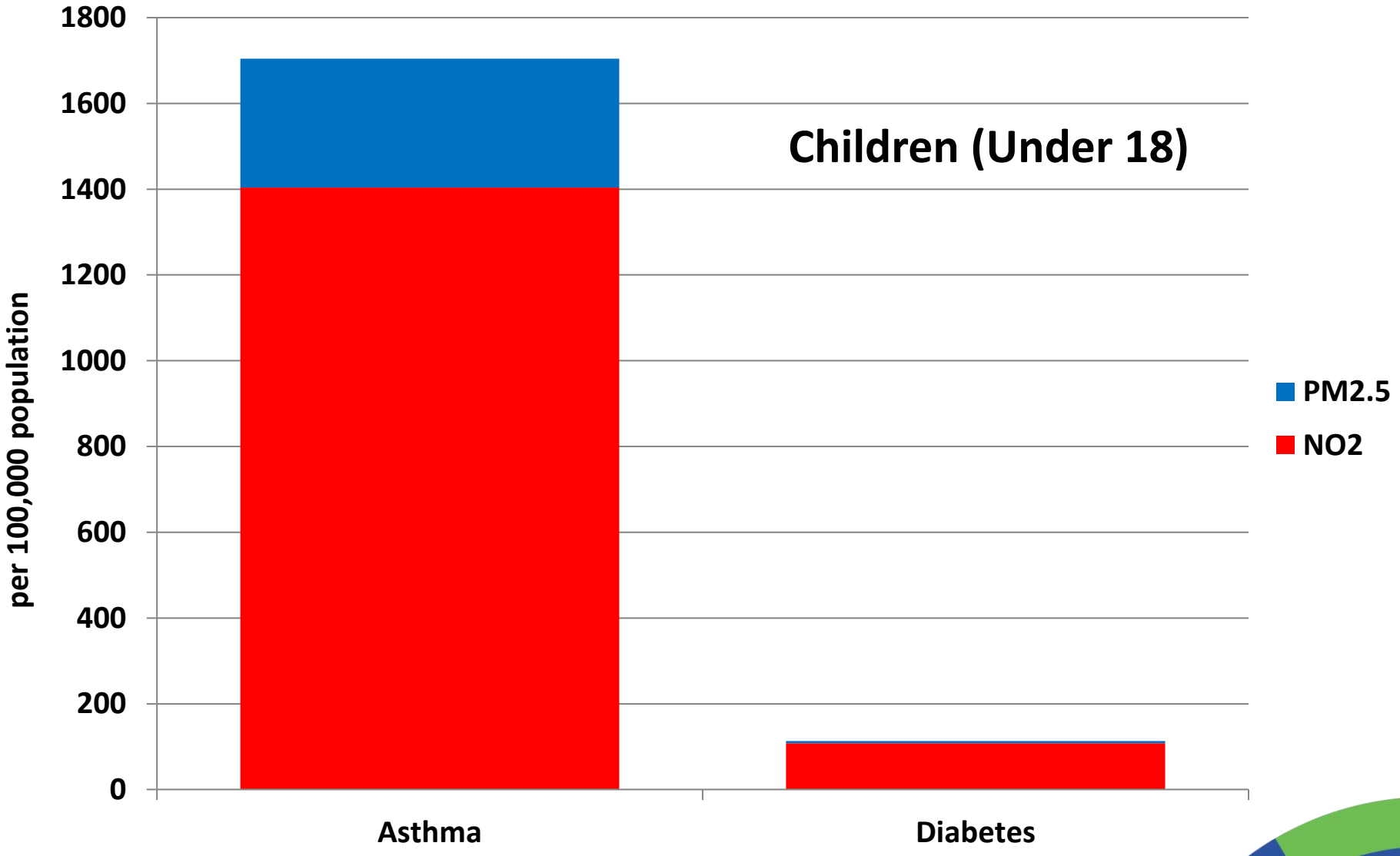

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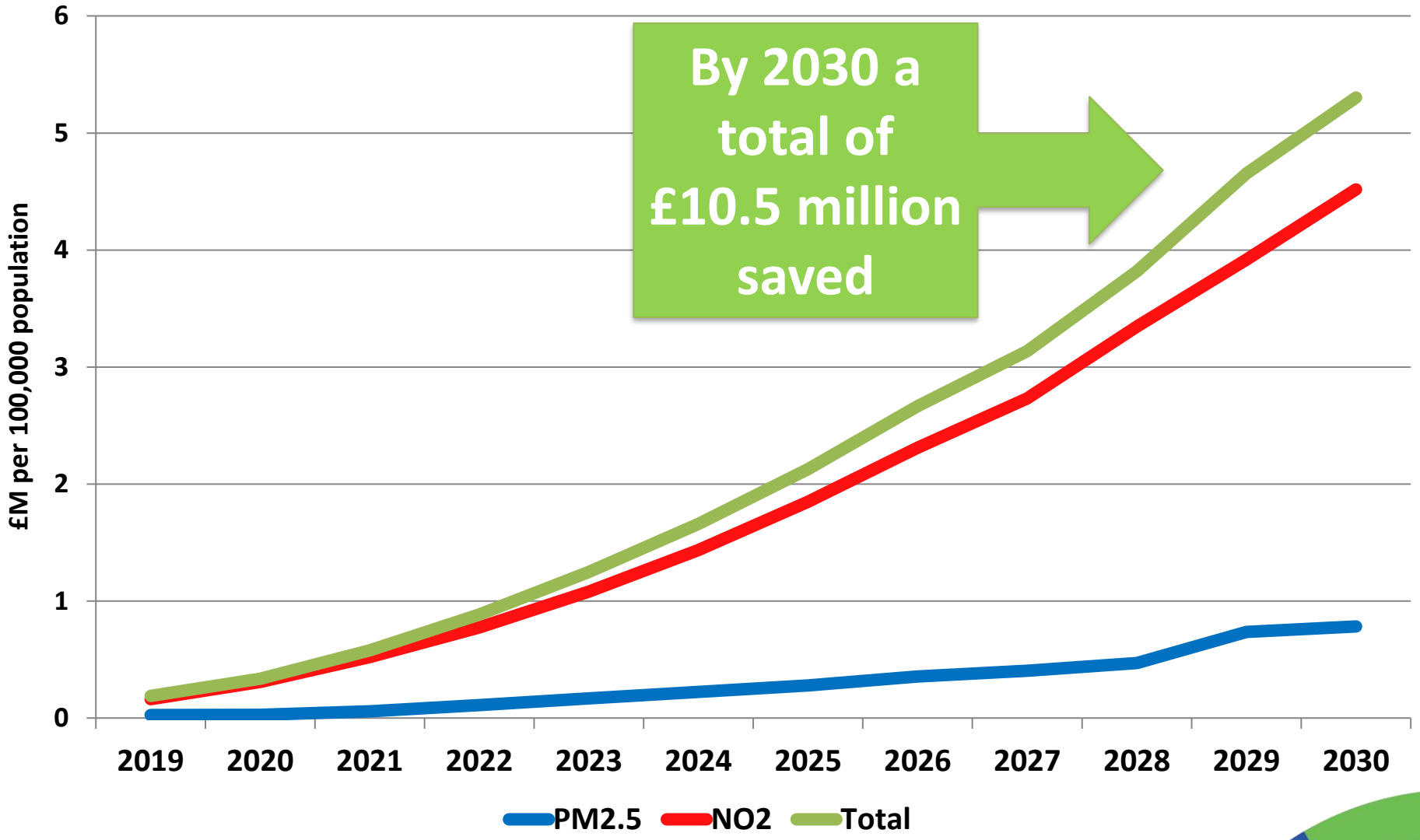

Estimated Savings to the Health and Social Care System in North Tyneside – population shift into low exposure (PM2.5 and NO2)

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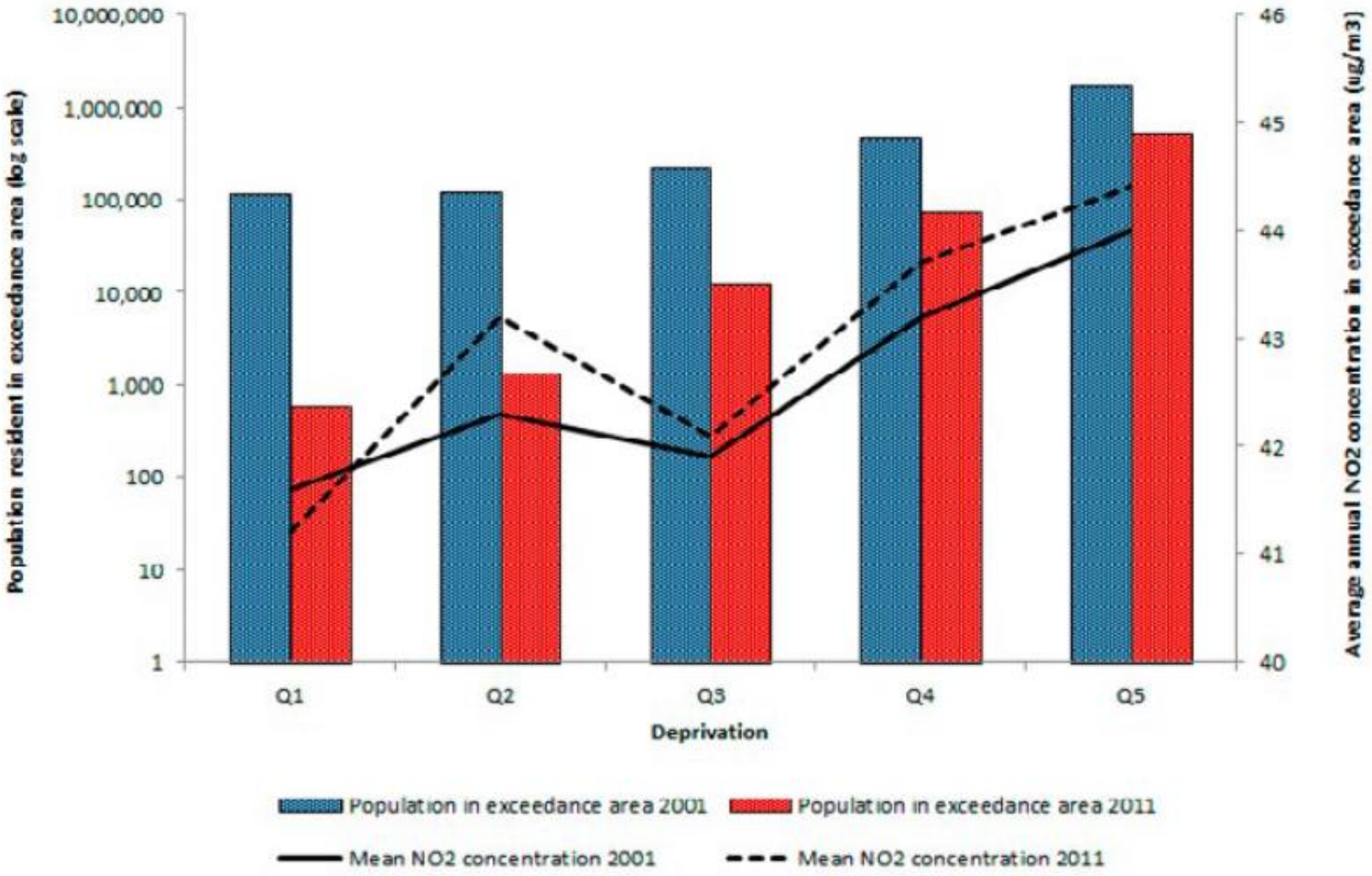

Comparison of LSOA exceed annual NO2 levels – quintile of deprivation – UK (2001 and 2011)

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Sources

Located more intensely in particular areas and communities, rather than others

Pathways

Concentrate pollutants into particular locations and away from others

Receptors

Unequally susceptible to pollutant impacts, including due to pre-existing health inequalities

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The double whammy…

Exposure to poor air quality

Exposure to risk factors

Results in LTC and reduced HLE and LE

Tobacco
Alcohol
Diet
Housing
Employment

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Disease prevalence and mortality	Kensington and Chelsea	Birmingham	North Tyneside	England
Coronary Heart Disease Prevalence	1.8	2.5	4.2	3.2
Coronary Heart Disease Hospital Admissions*	426	592	578	516
Coronary Heart Disease Mortality (under 75s)*	25.6	55.6	45.7	39.4
Respiratory Mortality (under 75s)*	18.1	47.8	37.6	33.8
Cancer Mortality (under 75s)*	110	154	160	137
Percentage of deaths in over 30's attributed to PM2.5	6.8	6.2	4.0	5.3

North Tyneside has greater morbidity and mortality than Kensington and Chelsea despite the fact that air quality is much better in North Tyneside

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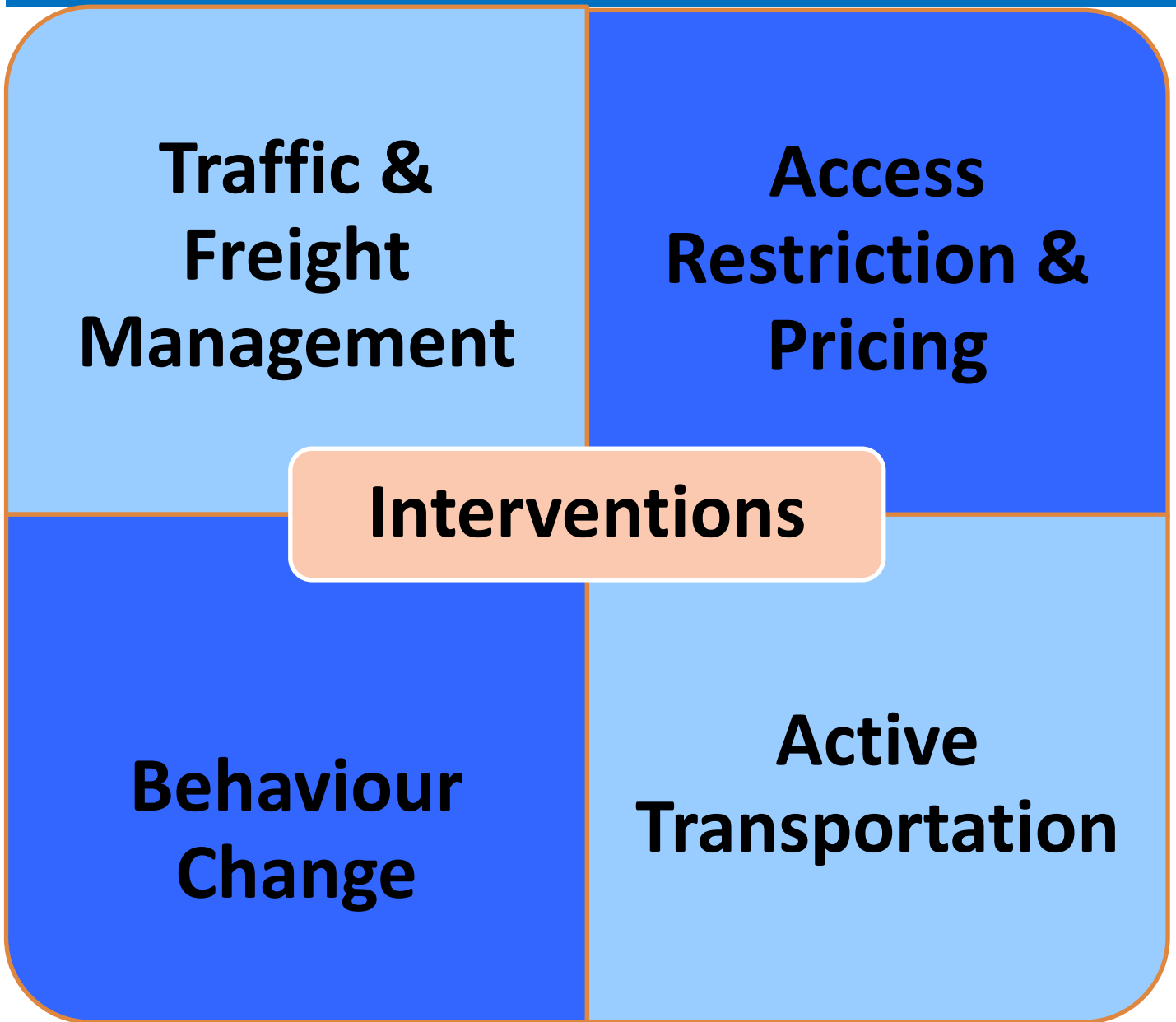
What works: Review Evidence

Cardiovascular Disease	Respiratory Disease
Particulate matter • Reduces mortality • Improves quality of life • Impacts Cardiovascular costs	**Particulate matter** • Reduces hospital admissions • Improves quality of life
Nitrogen Dioxide • Less evidence of its impact	**Nitrogen Dioxide** • Impacts medication need • Respiratory mortality

What works: Enabling Change



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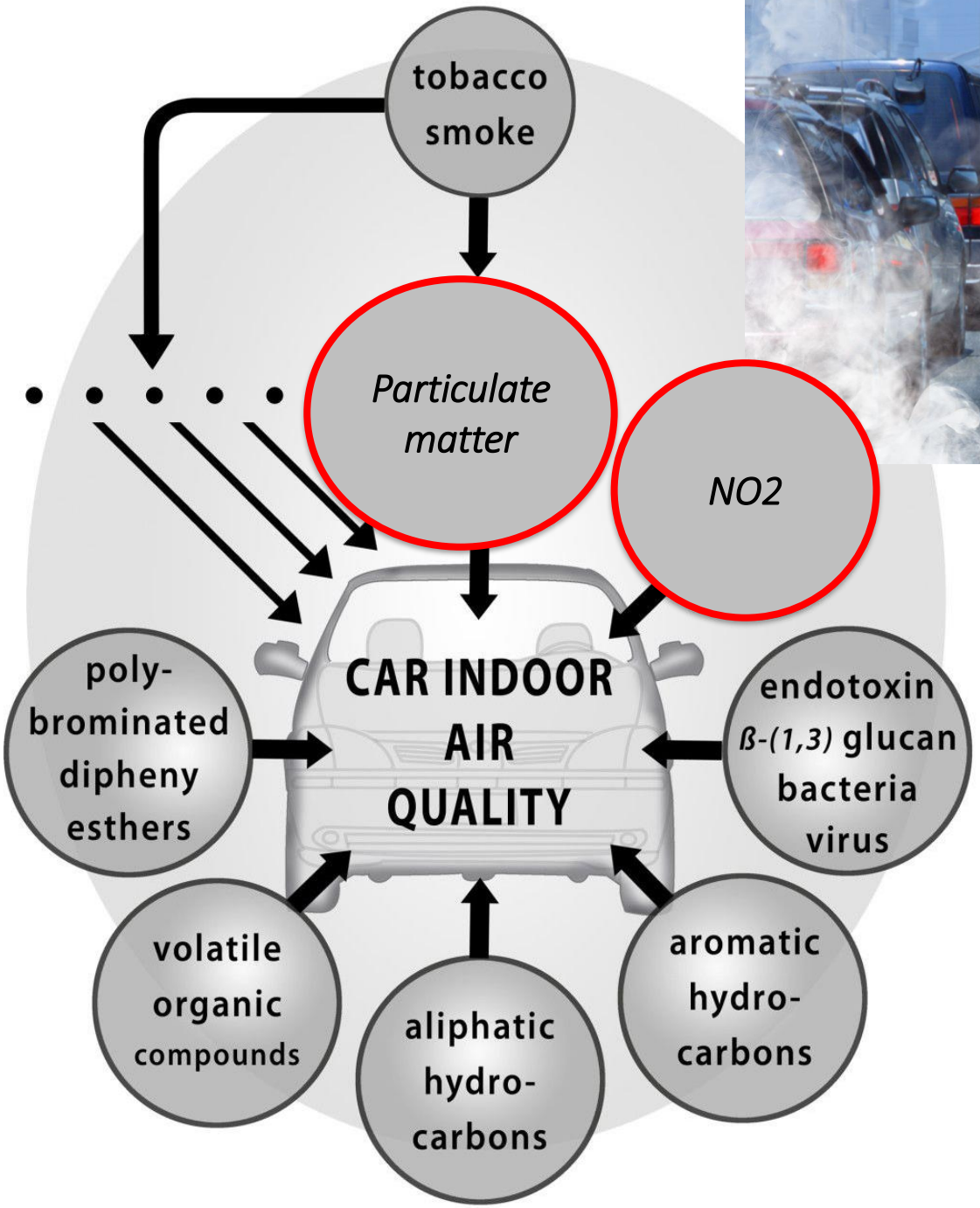

Less cars and vehicles on our roads in North Tyneside

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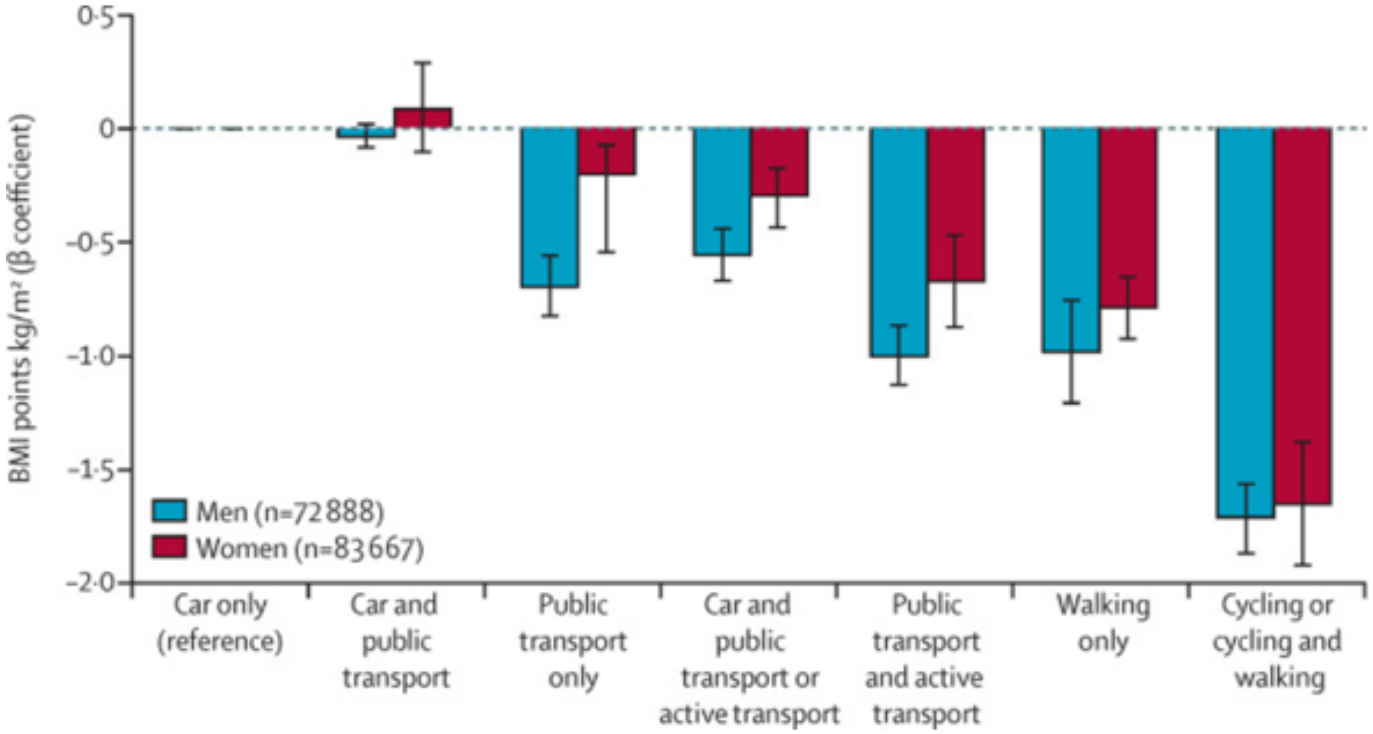
UK Bio bank Data: BMI and Commute to work



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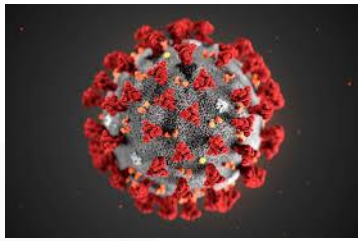
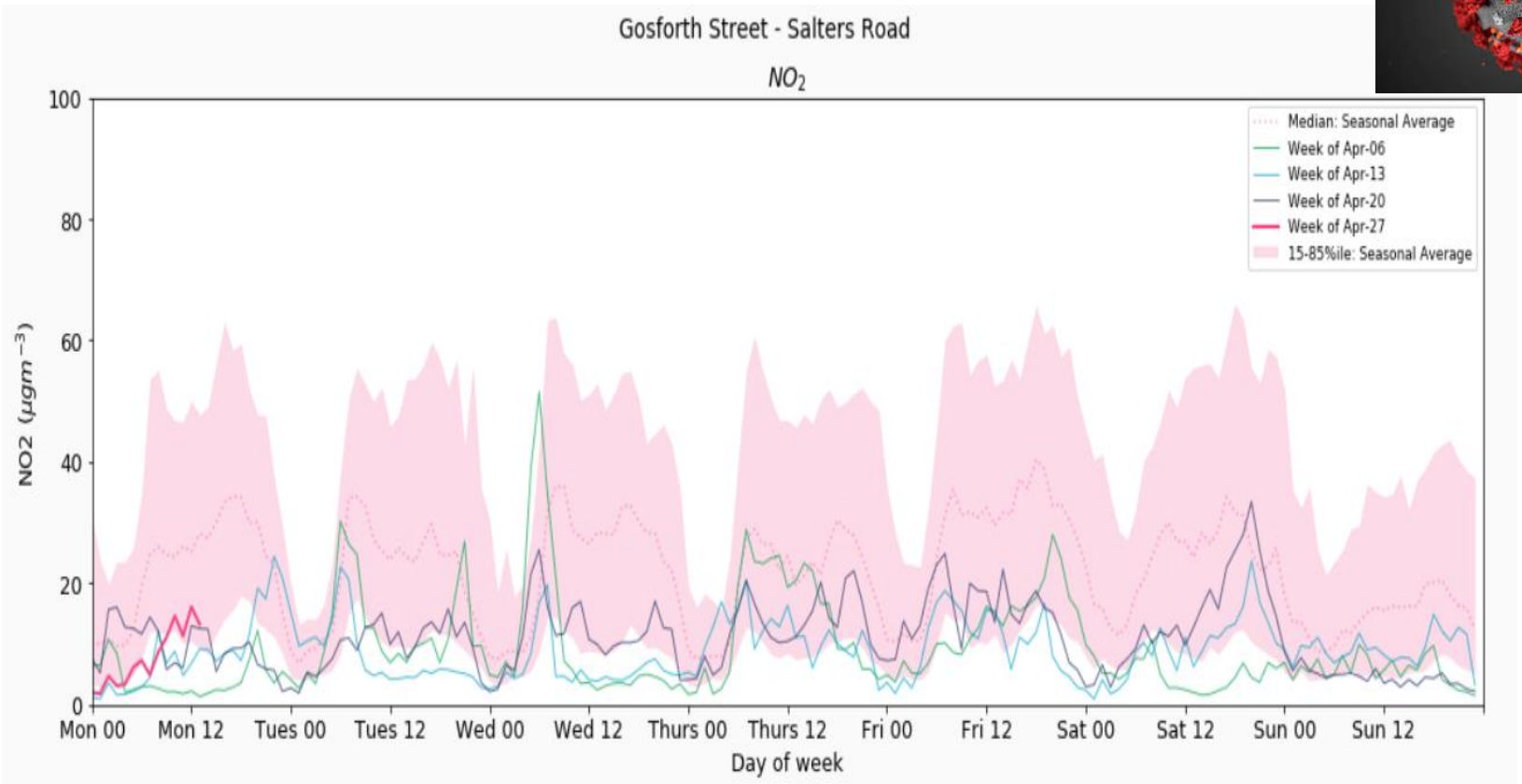
COVID-19 lockdown and air quality





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In Summary…

- The health harms from NO2 is a challenge (using the PHE thresholds)
- Around 11K people in North Tyneside have medium risk of poor air quality from PM2.5
- There are well known health inequalities relating to disease prevalence and health outcomes
- However this can not be solely attributed to poor air quality, although poor air quality may be a contributing factor (unable to quantify)
- Reducing the risk factors for disease in the population would lessen the health impact from poor air quality
- Evidence based action to improve air quality

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