Air Quality Health Indicator Tool: Identifying vulnerable populations exposed to air pollution

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Background

Poor air quality is the top environmental risk to human health in the UK[1]. Globally every year, exposure to air pollution is estimated to cause millions of deaths and the loss of healthy years of life. The burden of disease attributable to air pollution is now estimated to be on a par with other major global health risks such as unhealthy diets and tobacco smoking[2].

Vulnerable Populations

Anyone can be exposed to air pollution, and health effects will vary dependent on pollution concentrations and health status. Currently, there is no clear evidence of a safe level of exposure below which there is no risk of adverse health effects. Particularly vulnerable populations to the health effects of air pollution include[3]:

- Pregnancy and developing foetus
- Children, young people and older adults
- Existing respiratory conditions
- Existing cardiovascular disease (CVD)

Geography, inequalities and population to be considered in strategy development include:-

- Early years and schools
- Hospitals and other healthcare
- Nursing and residential care homes
- Populations in high air pollution areas
- Air Quality Management Areas (AQMA)
- People living in deprived areas

Air Quality Health Indicator Tool

An Air Quality Health Indicator Tool* has been developed for public health to aid in understanding population health impacts associated with air pollution. Mapping and indicators are available at local authority and/or Lower Super Output Areas. An example vulnerability indicator[4] is presented. Indicators presented in the Tool are displayed below with example key air quality health profile[5] for the Yorkshire and Humber Region;

Hospital admissions for Asthma, COPD, CVD, respiratory, stroke, IMD score, physical activity; cycling and walking, utilisation of green space & demographics.

Public health profile data

The fraction of mortality attributable to man made particulate air pollution (30+yrs) is 4.8%.

Under 19 hospital admissions for asthma is 140.88 per 100,000.

Air pollution fine particulate matter, fraction of mortality attributable to air pollution, population living within an AQMA and WHO Global Air Quality Guideline targets.

Annual air pollution concentrations

792,141 people are living within an Air Quality Management Area in Y&H (2017).

451, 469 people (8.2% of the Y&H population) are identified to be in the most vulnerable air pollution nitrogen dioxide deciles 9 & 10.

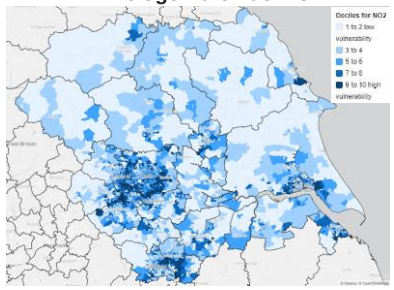
LSOA vulnerability deciles 1 – 10 for fine particulate matter and nitrogen dioxide.

Air pollution vulnerability

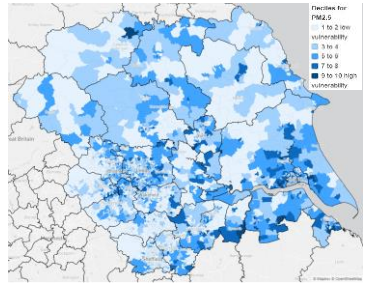
62,462 people (1.1%) are identified to be in the most vulnerable air pollution fine particulate matter deciles 9 & 10.

Vulnerability Indicator

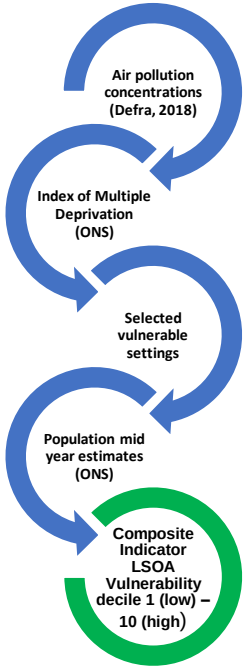
Nitrogen dioxide NO^2



Fine Particulate Matter $PM^{2.5}$



Vulnerability Indicator Methodology



Limitations of the Indicator Tool

Limitations of the Tool have been considered.

Air quality concentrations are modelled rather than monitored concentration data. This is due to accessibility of consistent air pollution concentration data across England. Using local authority monitored air quality concentration data would provide more representative data as the basis for indicators.

The locations within each vulnerability decile would need further local assessment for public health strategy or targeted messaging.

***The Air Quality Health Indicator Tool is not yet published and is under consultation. Please contact Amanda.Craswell@dhsc.gov.uk for further information. The likely host of the Air Quality Health Indicator Toolkit will be the Public Health Profiles: https://fingertips.phe.org.uk/**

Discussion

Health indicators associated with air pollution are typically found across multiple platforms. This Tool allows for a collection of indicators in one place. Further scope of the Tool would be to access monitored local authority air quality concentration data. The vulnerability indicator is new and brings opportunity for health. The vulnerable deciles show populations that may not have been previously considered as vulnerable to air pollution for public health action.

Recommendations

- To consider as part of Yorkshire and Humber DsPH priorities for Life chances for children & young people and Climate change & sustainability.
- To develop targeted intervention guidance for each vulnerability decile (1 Low -10 High).
- Tool implementation into Air Quality Strategies and Action Plans.

References

[1] Defra; (2019); Clean Air Strategy; available here
[2]World Health Organization. (2021). WHO global air quality guidelines: particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide. World Health Organization available here.
[3]PHE; (2018); Health Matters: air pollution available here
[4] UKHSA (2021) Environmental Epidemiology Air Pollution Exposure Surveillance; Unpublished
[5] PHE; Adapted from https://fingertips.phe.org.uk