

Citizen science – local air quality; local action

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Local air quality

Poor air quality is a significant public health issue, the effects of long-term exposure to air pollutants on mortality are well recognised, although less is known about effects on morbidity. Nitrogen oxides and particulate matter are two of the primary pollutants associated with traffic emissions.

Using figures from 2008, it was estimated that anthropogenic particulate matter had an effect on mortality equivalent to nearly 29,000 deaths and an associated loss of total population life of 340,000 life-years¹. Effects of short-term exposure to other common air pollutants such as sulphur dioxide, nitrogen dioxide and ozone have also been identified, but the effects of long-term exposure to these pollutants is less well characterised, although evidence is developing. A recent review by the World Health Organization notes that studies have found that both day-to-day variations and long-term exposure to nitrogen dioxide are associated with mortality and morbidity. It indicates that the evidence is suggestive of a causal relationship, particularly for respiratory outcomes, but notes that nitrogen dioxide may also represent other constituents (which have adverse health effects) not represented by currently regulated metrics of particulate matter².

The Environment Act 1995 introduced a system of local air quality management (LAQM) because certain pollutants are best monitored and managed at a local level. Local authorities are required to review air quality within their boundary, to assess whether certain health-based national air quality objectives will be achieved and to work towards achieving those objectives. Sheffield aspires to be a city where health inequalities are eliminated and air is healthy for all to breathe; it has appointed the Director of Public Health as the overall 'Air Quality Champion' as part of their role on the city's Health and Wellbeing Board. Air pollution has recently been estimated to account for up to 500 premature deaths a year in Sheffield³.

Community diffusion tube monitoring

Community air quality monitoring for nitrogen dioxide started in Sheffield in 1998 in backyards in Tinsley, a neighbourhood to the east of Sheffield traversed by the M1 motorway. Monitoring began because local people were concerned about the effects of air pollution on their health and quality of life. The community air quality monitoring network has been

extended to cover other areas of the city, involving community partners such as local forums, environmental groups, neighbourhood watch groups and schools.

Community organisations get involved because they are well placed to know the locations in their neighbourhoods where residents are concerned about air pollution. This brings the issue of air pollution down to the local level, and empowers local communities to better articulate their concerns about poor air quality, traffic and its effects on the community's health and quality of life.

East End Quality of Life Initiative (EEQOLI) supports community groups to set up local pollution monitoring. EEQOLI is currently funded by a Sheffield City Council public health grant, and previously by NHS Sheffield (the primary care trust for Sheffield), which on 1 April 2013 became part of Sheffield City Council. The community diffusion tube scheme has been part funded by Sheffield City Council as part of its LAQM work. EEQOLI supports community groups in the monitoring of nitrogen dioxide by diffusion tube, with Sheffield City Council being responsible for managing the analysis, the quality assurance and quality control of the diffusion tubes.

Every month community volunteers change the diffusion tubes. The tube details (batch number, tube number, site, date and time of change over) are written on a log sheet and sent with the exposed tubes to the laboratory for analysis. The next batch of unexposed tubes is sent out to each community group before the changeover date. This process takes no more than about half an hour each month.

Graphs of the diffusion tube results are produced month by month each year, and graphs of adjusted annual averages are also produced using regional bias adjustment factors, and are emailed or posted to the community groups, and made available for download from the website at <http://sheffieldeastend.org.uk/AQmonitoring.htm>. A monthly newsletter is also emailed to community groups summarising recent research into the health effects of air pollution and noise.

Local activity

Examples of how air quality data has been used by local communities in Sheffield are listed below.

- Informed planning application concerns and environmental assessments
- Articles in community newsletters

- Supported requests for improvements to public transport
- Used to comment on the Local Transport Plan
- Used to support teaching of science in the 21st Century National Curriculum Framework in Secondary Schools
- Added to Sheffield City Council data in areas where there was no air quality monitoring
- Raised awareness that many people are living in areas with poor air quality
- Used in local media

In 2009 an existing Sainsbury's superstore in Sheffield applied for planning permission to extend the store by 44% of the floor area. At a Planning and Highway Committee meeting in August 2010 local councillors voted against a planning officer recommendation to grant planning permission, primarily because of traffic and air quality concerns.

Carter Knowle and Millhouses Community Group, working with EEQOLI, had been monitoring air pollution in the area using nitrogen dioxide diffusion tubes. The proposed development was within an existing city-wide air quality management area (AQMA) for nitrogen dioxide and results from the community monitoring scheme showed that existing concentrations of nitrogen dioxide around the proposed development were higher than the annual average national air quality objective of 40 µg/m³. A 900 signature petition was submitted to Sheffield City Council, alongside 27 letters of objection to the development including one from the Director of Public Health at NHS Sheffield. Councillors were presented with this evidence, and considered that the proposed development could potentially have a detrimental effect on the health and wellbeing of local people.

Sainsbury's appealed the refusal to grant planning permission to the Planning Inspectorate⁴. The Inspector rejected Sainsbury's appeal in August 2011 because of concerns about air quality and health, and assumptions made in the air quality impact assessment that accompanied the planning application. The Inspector concluded that "... the potential harm I have identified with regard to the effect of the proposal on local air quality, and consequentially human health, is not outweighed by other considerations ..." and "... whilst I have had regard to the conditions suggested by interested parties, it would not be possible, in my judgement, to make the proposal acceptable in planning terms through the imposition of reasonable conditions."

Sainsbury's took its appeal to the High Court, although days before the case was due to be heard in October 2012 it withdrew the appeal.

Working with Healthy Air (www.healthyair.org.uk/) EEQOLI organised a successful conference in December 2011. Presentations included speakers from Client Earth and Healthy Air, along with a presentation from NHS Sheffield Public Health on the health effects of poor air quality, and a speaker from Carter Knowle Community Group on its involvement with the 2009 Sainsbury's planning application.

The results from local air quality monitoring have led to many articles in local newspapers and radio coverage. Regional television (Look North) has run numerous stories after EEQOLI informed them of possible air quality and health news items.

EEQOLI and other community groups sit on a multidisciplinary working group with Sheffield City Council that helped develop the new air quality action plan for Sheffield 2015, which was approved by the City Council in July 2012. EEQOLI is now involved in the Air Quality Action Plan Working Group, working on the implementation of the action plan.

Conclusions

EEQOLI has demonstrated the continuing benefits of involving local people and community groups in air quality monitoring, enabling them to participate in improving their local environment and influencing planning and policy decisions. Through working with public health colleagues at Sheffield City Council, residents can help to improve and protect the health and wellbeing of all the people of Sheffield.

References

- 1 COMEAP. The Mortality Effects of Long-Term Exposure to Particulate Air Pollution in the United Kingdom. 2010.
- 2 World Health Organization. Review of Evidence on Health Aspects of Air Pollution – REVIHAAP. WHO Regional Office for Europe, 2013. Available at www.euro.who.int/__data/assets/pdf_file/0020/182432/e96762-final.pdf.
- 3 Sheffield City Council (2012). Air Quality Action Plan 2015.
- 4 Planning Inspectorate. Planning reference: APP/J4423/A/10/2143547. Available at www.pcs.planningportal.gov.uk/pcsportal/casesearch.asp.