

Science for Environment Policy

Air quality linked to wellbeing at a regional level in Europe

The impact of air quality on public welfare is important to policy development. However, it is difficult to make a clear link between the two when air pollution tends to be reported at a country level and wellbeing is an individual measure. A new study takes a step further towards linking the two by analysing regional level air quality across the EU and relating it to levels of life satisfaction.

Economic measures of welfare, such as Gross Domestic Product (GDP), do not consider important non-market influences, such as environmental quality and a person's [health](#) status or wellbeing. Recently, however, efforts have been made to identify more subjective measures of wellbeing, such as those captured with 'life satisfaction' questions.

A specific challenge when linking environmental quality to life satisfaction is that the former tends to be measured at a national or regional levels, whilst the latter is an individual subjective measure. Therefore, research in this area either tends to link country-level emissions of pollutants to average individual measures of life satisfaction, or uses self-reported negative impacts of pollution, rather than an individual's actual exposure to pollution.

The study attempts to bridge the gap between the individual level of welfare data and the national or EU level of air pollution data. It is the first study to analyse subnational (regional) level data on [air pollution](#) across 23 EU Member States with respect to a European wide survey with data on individual life satisfaction. It focuses on sulphur dioxide (SO₂) an important indicator for industrial and transport activities, which can be analysed at a regional level.

Data on SO₂ concentrations were collected from a network of monitoring stations across 248 regions, from 2002 to 2007, using data from AirBase¹, a public air quality database system of the European Environment Agency. Survey data on life satisfaction were obtained from the European Social Survey² for the same time period. By merging and comparing these two data sources, a unique dataset was created to analyse how SO₂ concentrations – which are not linked to a specific nation - may affect subjective wellbeing.

As could be expected, the results indicate that there is a significant negative relationship between regional concentrations of SO₂ and life satisfaction, i.e. in regions with higher SO₂ pollution, life satisfaction tends to be lower, everything else being equal. More quantitatively, an increase in SO₂ concentration of 1 microgram (µg) per m³ of air is associated with a reduction in life satisfaction of between 0.016 and 0.030 points on an 11-point life satisfaction scale. This is higher than previous estimated impacts at a national level, which suggested reductions in life satisfaction of between 0.003 and 0.006 points for the same increase in SO₂ concentrations.

The study also investigated the potential influence of other factors on the relationship between SO₂ and wellbeing, such as health status, size of city or settlement, and regional macroeconomic factors (GDP per capita, unemployment rate and population density). The results indicate that although SO₂ does seem to influence life satisfaction indirectly through health impacts, it also has more direct effects, i.e. it can reduce wellbeing even without causing negative health impacts. It was found that other factors, such as regional unemployment and income did not significantly alter the relationship between SO₂ concentrations and life satisfaction.

The analysis demonstrates a significant negative impact of regional SO₂ concentrations on life satisfaction, and that the impact appears to be greater than when air pollution data are measured at a national level. The researchers point out that SO₂ is a transboundary pollutant and that this form of analysis may not be appropriate for air pollutants that have a more limited dispersion locally.



4 July 2013

Issue 335

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Source: Ferreira, S., Akay, A., Brereton, F., *et al.* (2013) Life satisfaction and air quality in Europe. *Ecological Economics*. 88:1-10. Doi: 10.1016/j.ecolecon.2012.12.027.

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To cite this article/service: "[Science for Environment Policy](#)":

European Commission DG Environment News Alert Service, edited by SCU, The University of the West of England, Bristol.

1. See: www.eea.europa.eu/themes/air/air-quality/map/airbase

2. See: www.europeansocialsurvey.org