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Big data and human biosensors – birthweight as a biomonitor for air pollution levels. A population based study using routine data.

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Introduction

In the natural sciences biomonitors, (organisms, such as pine needles, shells, lichen, that can provide quantitative information on the quality of their past and present environments) have been developed for environmental measurement. In recent year's physiologists have started to explore if human tissue could also be used.

itors' information. Importantly if this method proves to be reliable it will be a relatively cheap method for collecting information that is actually personally monitoring.

Objectives and Approach

The costs of collecting and processing human tissues for biomonitoring, may be too prohibitive for its use in wide scale monitoring. In contrast if biomonitors could be identified within a routine data collection process that were part of standard medical recording a low cost, widely available large sample would be available to scientists. Pregnancy is known to be effected by air pollution, therefore we explore whether birthweight, recorded in maternity records, could be a biomonitor for air pollution.

Results

We use maternity records (~1 million births) in Scotland between 2000 and 2015. We modelled, at the individual mother level birthweight, controlling mother's age, estimated household income, local area crime rates and area level of multiple deprivation. We then aggregate and calculate the averaged of the residuals for this model for all mothers within an intermediate datazones (small areas of around 4000 residents). These mean deviations were then compared with pollution modelled figures produced by AEA for the Scottish government averaged over the same spatial units and time period as the maternity data. "We find a relatively strong correlations (between -0.37 and -0.39) between our 'biomonitor estimates' of air pollution derived from the maternity records and the entirely separated modelled air pollution data."

Conclusion/Implications

As far as we know this is the first study to demonstrate that it may be possible to use routine health data to derive 'biomon-