

Outdoor NO<sub>x</sub> and stroke mortality – adjusting for small area level smoking prevalence using a Bayesian approach.

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Ecological studies are often carried out to examine the effects of environmental, socioeconomic or health care factors on health outcomes. There are recognised limitations to ecological studies which may be addressed to some extent by using small area level studies. A further problem may be the paucity of data on potential confounders. Sometimes these may be available through population sample surveys e.g. smoking prevalence data from health and lifestyle surveys. Because these are sample surveys, the numbers sampled at the small area level may be very sparse or even nil for some areas. One approach to using these data in spatial analyses is to aggregate the data at a larger spatial level and either use multi-level methods or assign aggregate values to all small areal units within the larger area. The latter is an approach we recently used to adjust for smoking prevalence when examining the association between outdoor air pollution levels and stroke.<sup>1</sup>

An alternative approach is to use potential confounder data at the small area level within a Bayesian framework. In addition to incorporating spatially structured and unstructured random effects, a single model may be used to incorporate smoothing of the confounder data, allow for the uncertainty in estimates and predict values in areas with no data on the confounder variable. We plan to present results using this analytical approach to adjust for smoking when modelling the association between outdoor NO<sub>x</sub> levels and stroke mortality at the small area level.

1. Maheswaran R, Haining RP, Brindley P, Law J, Pearson T, Fryers PR, Wise S, Campbell MJ. Outdoor air pollution and stroke in Sheffield, United Kingdom – a small-area level geographical study. *Stroke* 2005;36:239-43.