Air pollution, occupation and health: an ecological analysis

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ABSTRACT

Background: The adverse health effects of air pollution have become increasingly recognised in recent decades. These effects have been studied both in workplaces as a result of occupational exposure to hazardous agents and in the wider environment. Although most work has demonstrated that lower socioeconomic status is associated with higher ambient air pollution exposure, much less is known about the relationship between ambient air pollution and occupational status. This study explores this relationship in the metropolitan borough of Rotherham, England.

Methods: The study was ecological in design. Individual job data pertaining to Rotherham residents was grouped at area-level under the categories of the Standard Occupational Classification 2010. Area-level health data for conditions and metrics known to be associated with air pollution exposure was provided by the local council in the form of an indirectly age-standardised ratio (IASRs) for each indicator. Area-level air quality data was mapped using Geographical Information Systems (GIS) software from 80 nitrogen dioxide (NO2) monitors placed across the town. Associations between occupational group, air pollution exposure and related ill-health were assessed using multivariate regression analyses in IBM SPSS software Version 22.

Results: Air quality was poorest in the areas surrounding the town centre and major arterial traffic routes into the town. After adjustment for income, there was no significant relationship between residents’ occupational classification and their exposure to ambient NO2 at area-level. Areas in which there were higher numbers of residents receiving out-of-work benefits were statistically more likely to experience higher levels of NO2.

With respect to health, areas with high concentrations of NO2 were statistically more likely to have higher rates of cardiovascular and circulatory disease under the age of 75 after adjustment for income and occupational category. This relationship was also apparent for low weight births.

Conclusion: Deprivation status is the main explanatory variable for differences in residential exposure to NO2 in Rotherham. No differences were found in the associations between area-level NO2 and rates of ill-health when adjusting for income or occupational
status, suggesting that these latter variables may act as surrogates. In the absence of sophisticated occupational exposure tools such as job exposure matrices (JEM), subtle interactions between occupation and ambient air pollution resulting in increased health risks cannot be excluded.