

ALTERNATIVE EXPOSURE ASSESSMENT METHODS FOR RESIDENTS NEAR INCINERATORS: A SIMULATION STUDY

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Background and Aims: A multisite project on health effects of exposure to incinerators (Monitor Project) was undertaken in Emilia-Romagna region (Italy). A retrospective cohort of residents (period 1995-2006) was enrolled to study mortality and morbidity effects. Residential exposure to incinerators was estimated from a dispersion model using emission data at enrolment (1995). Individual residential exposure was assigned to the cohort (about 250.000 subjects). A successive categorization (quintiles) was made for epidemiological analyses. Cumulative exposure could not be calculated for all cohort members. We have conducted a simulation study, using a sub-sample of the cohort with complete cumulative exposure data, to evaluate the consequences of possible misclassification of this exposure assessment method.

Methods: For a sub-cohort (about 30.000 subjects), information about residential history from the start of the plant (1980) was available, and cumulative exposure (period 1980-1995) for each subject was calculated using two different dispersion maps over time, and residential mobility. A validation study was performed to estimate possible misclassification of exposure at enrolment, calculated as for the whole cohort. A simulation procedure was used with 1000 datasets with a mean incidence rate ratio (IRR)=1.5 between the highest and the lowest exposure class of cumulative exposure and a statistical significant trend.

Results: When we compared categories of prevalent exposure at baseline with cumulative exposure, 73.5% of subjects remained in the same class and 5.2% move to nonadjacent categories. Extreme classes (lowest and highest) showed higher concordance (81.7% and 84.50%). Overall weighted kappa was 85.3%. The simulation study provided a median value of 1.414 for the IRRs between extreme categories [range:1.06-2.04] with 29.2% of the simulations overestimating the IRR. The positive trend remain significant in 63.9% of simulations.

Conclusions: We found a moderate agreement between baseline and cumulative exposure. However, in case of nondifferential misclassification between nonadjacent categories, caution regarding estimation has to be considered.