TIME SERIES ANALYSES OF DAILY MORTALITY ON DAILY PM2.5, PM10 AND BLACK SMOKE LEVELS IN THE NETHERLANDS; IS DISTINGUISHING BETWEEN DIFFERENT PM MEASURES POSSIBLE ?

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Background and aims: Information on the relationship between PM2.5 levels and mortality in Europe is sparse because of the limited PM2.5 measurement data that were available until recently. In the Netherlands, daily PM2.5 data have been measured at 15 sites of the National Monitoring Network since 2008. We have analyzed PM2.5 data for 2008 and 2009 in combination with daily mortality data on total and cause-specific mortality. We have compared the results of these analyses with results for PM10 and Black Smoke over the same period.
Methods: We analysed the data using Poisson regression in generalized additive models (GAM) with R. Associations between mortality and PM were adjusted using splines for long term and seasonal trend, influenza incidence, mean temperature, relative humidity, barometric pressure, as well as indicators for day of the week and for holidays. Results were presented as Excess Risk per 10 $\mu g/m^3$ increase in daily PM concentrations. Analyses were performed for 4 different time lags. In addition distributed lag models will be analyzed.
Results: PM levels all were statistically significant associated with daily mortality. The Excess Risk for daily PM2.5 (lag 1) and daily total mortality was 0.8% (0.3% - 1.2%). Results for different measures, different lags and cause-specific mortality will be presented. Correlations between particles measures was high (> 0.79). Because of this high correlation, no distinction could be made between the relative importance of the different PM measures. Initial results of distributed lag models indicate that single lag models may underestimate the true mortality impact of PM air pollution.
Conclusion: Newly available PM2.5 data in the Netherlands show statistically significant associations with daily mortality. This is in line with data from the US and other parts of the world. Due to the high mutual correlation between the three PM measures, no distinction could be made between the relative importance of the different measures.