Reviewer's report

Title: Particulate air pollution on cardiovascular mortality in the Tropics: Impact on the elderly

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Reviewer: Antonio Ponce de Leon

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This paper reports the results of a long-term time-series analysis using daily mortality counts and air pollution exposure from Singapore. Results from the statistical analysis consist of single day effect estimates as well as cumulative estimates using distributed lag nonlinear models. Quasi-Poisson models regarding terms for confounders such as seasonality, trend, day-of-the-week, holidays, periods of known epidemics, were applied. As in many studies of similar design the main findings were significant excessive risks of non-accidental and cardiovascular causes in the elderly group associated with particulate matter concentrations (PM2.5 and PM10). The estimated effects were of similar magnitude to those in similar studies carried out in Europe, Asia, North and South America. There was evidence of mortality displacement in the analysis of cardiovascular mortality.

I think the data handling and the statistical analysis conducted in the paper are sound and up to date. The presentation of results is clear and illustrates the main parts of the analysis.

Major comments:

The authors emphasize that there are few similar studies carried out in equatorial countries. However, the article discussion could benefit a great deal if they compared their research and results also with studies carried out in tropical countries, even though the study cities were not so near the Equator, such as the ESCALA project (1).
In the methods section it is mentioned that during parts of the year the smoke caused by biomass burning contributes to the air pollution levels. Biomass burning air pollution is rather different in chemical composition than vehicle and industrial air pollution. I wonder if that mix of air pollution sources could have been exploited in the time series analysis as an effect modifier, for instance stratifying the analysis according to dry and wet seasons, or even including some sort of term to account for the yearly month-long episode of biomass burning.

It has been mentioned also that other age groups and/or groups of causes were not investigated due to Singapore's population size. That can be discussed based on theoretical and applied statistical grounds. For instance, in the present study the average of daily deaths for non-accidental causes in the elderly is about thirty, whilst for cardiovascular causes is about eleven. These are considered counts of moderate size. Smaller counts on average can be analyzed using the same methods. Therefore, if there is interest in exploiting the groups of even more elderly people and/or more restricted groups of causes in Singapore for the same period, that should be fine.

It was mentioned in the methods section that there were missing values in the air pollution network dataset, but there is no information about how many sites were regarded in the exposure assessment nor the amount of missing data points overall as well as per site. Furthermore, depending on the amount of imputation that has been carried out some sort of sensitivity analysis as regards the effect estimates should be proposed.

In Figures 1a and 1b the displayed patterns for the group "below 65" suggest protective effects, specially for PM2.5. Yet, these findings have not been discussed.

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