

Reviewer's report

Title: Effects of ozone and particulates on pediatric patient asthma-related emergency department visits in Washington, DC, from 2001-2004

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Reviewer: Nino Kunzli

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The study investigates the association of asthma emergency department (ED) visits as well as hospitalizations through the ED (age 1-17) and O₃ while taking into account other environmental covariates, including pollen and temperature as they may all be confounders of the main effects. The study also investigates the ED/admission rates as a function of high poverty (in zip code areas). 8-hr maxima of O₃ were used as exposure term. The daily mean of all available PM_{2.5} was used to characterize exposure across DC.

Both questions are relevant and well posed.

This is a very interesting project, addressing relevant – not much investigated – effects of potentially interrelated environmental factors. Overall, the manuscript is well written and clear. However, there are issues that need clarification, changes in the presentation, and further analyses.

MAJOR COMMENTS

1. The major strength of the paper is at the same time the major challenge and weakness: this article addresses not only environmental effects on ED but also how ED rates differ across zip code categories, defined by poverty rates. While I thought this to be a very important and relevant issue, the authors need to do a better job in presenting – in a more balanced and complete manner – relevant information for both parts of the analyses. Moreover, the result section and discussion need to separate the issues in a more succinct way. E.g., the manuscript could go through all aspects of the effects of O₃ and the other environmental factors, and their interaction. Thereafter, the effect of SES can be presented in full detail. The last part would address the interaction of zip code SES with the main effects of the first section. (E.g., page 11/12: I suggest to reorganize the presentation. Separate the results of SES from the results of SES-specific effects of O₃. This is currently intermingled.)

2. Else – as it currently stands – one could argue that these issues are two separate papers. I don't necessarily propose to do this but the authors have to carefully think about the pros and cons of putting both 'stories' in one single paper. Both aspects, if presented in one manuscript, must be addressed in the title.

3. While some figures are redundant, other information is missing or just described in the text. I propose to present figures showing the lag 0-5 coefficients for all major environmental factors. In fact, it would be particularly useful and strengthen the interpretation to also show the lag -1 results which one would expect not to be associated with the outcomes. It is interesting and requires a better discussion how these lag patterns differ across the environmental factors (O₃, pollen, temperature). The same presentation can include the stratification by zip code poverty. It is currently not crystal clear whether O₃ and pollen affect ED only in low poverty zip codes or just stronger than in the other areas. It is a rather relevant question whether environmental factors affect people in different regions differently, and this could be presented and discussed in more detail (rather than overemphasize the 'ecologic nature' of this analysis; this is of course obvious if one makes clear that it is not an analysis of the effect of a subjects' SES but a contextual analysis).

4. The manuscript fails to address how the interesting environmental covariates interact, at least with regard to the effects of O₃ on ED. Do pollen modify the effects of O₃? In fact, the reverse question is of relevance as well, mainly whether pollen effects are larger if O₃ is high. I think the authors miss a very good opportunity to address these interactions in more detail.

MINOR COMMENTS

1. Why is the DISCUSSION called 'CONCLUSION'?
2. How was temperature modeled to reflect a potentially U-shaped association?
3. Why should weed pollen have different effects on ED visits and hospitalizations? This needs some discussion.
4. Figure 2 is not very informative
5. Figure 4 or 5 seem redundant given the similarities. This can be described.

What next?: Unable to decide on acceptance or rejection until the authors have responded to the major compulsory revisions

Level of interest: An article of outstanding merit and interest in its field

Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a statistician.