

## **Reviewer's report**

**Title:** Vegetation fire smoke, indigenous status and cardio respiratory hospital admissions in Darwin, Australia, 1996-2005.

**Version: 3 Date:** 11 February 2008

**Reviewer:** Paul Villeneuve

### **Reviewer's report:**

Review: Vegetation fire smoke, indigenous status and cardio-respiratory hospital admissions in Darwin, Australia, 1996-2005

Overall comment:

The paper is well-written, and easy to follow. While associations between asthma and air pollution have been investigated in numerous locations using time-series or case-crossover approaches, the city of Darwin holds particular appeal given the nature of the PM pollution is due almost entirely to fire smoke.

The biggest concern I have with the paper is the lack of PM10 measures from monitoring stations that span the entirety of the study period. While the authors provide little information about the availability of daily measures from fixed site monitors, my understanding is that daily PM10 data are only available for 2005. The relationship between meteorological variables and PM10 were then used to develop a predictive model to estimate PM10 using these same meteorological variables in other years. The lack of data of daily PM10 levels is important, and warrants more discussion from the authors. They indicate a predictive model was developed that yields a correlation of 0.68 between predicted and observed PM10. This correlation is not necessarily a good barometer of being able to use daily predictive estimates of PM10 in a time series model. The correlation measures how well the predicted and observed agree in linear fashion. What might be of particular interest is how well the predictive model may be able to identify episodes of very high pollution days. My major problem with this paper, is that I am unconvinced that the method used to predict PM10 is valid and accurate enough for the use in daily time series analyses. Related to this, I am unsure of the appropriateness of including terms in the Poisson model (e.g., temperature, and humidity) that were also used elsewhere to predict the PM10 level for that day.

The authors make use of admission to hospitals for asthma and cardiovascular events. In Canada, there is a tremendous difference with respect to using emergency department data versus hospital discharge data. For many conditions such as asthma, visits may occur to the emergency department but the patient is rarely admitted to the hospital. Therefore, if analyses were restricted to discharge data, one could conceivably miss a number of asthma attacks, and the patient population (that was admitted) may reflect those were the event was much more

serious, or dire. It would be helpful if the authors could comment on this.

Several studies have found that children and the elderly are more susceptible to the effect of outdoor air pollution. Can the authors describe/investigate whether this is the case in their study population? On a related point, can such (age) difference in demographics contribute to differences found between the indigenous and non-indigenous populations?

Major Compulsory Revisions (which the author must respond to before a decision on publication can be reached)

Additional justification of the use of the predictive model to infer retrospective daily levels of PM10 is needed in light of my comments above.

Some comment on the use of discharge data, rather than emergency department visit records would be helpful.

The previous study in Darwin made use of case-crossover approach to investigate associations between ambient levels of PM and hospitalization. In light of this, could the authors explain their use of a time-series methodology? It might have made more sense for comparative purposes, and in light of some methodological criticisms of time series approaches to follow the case-crossover method.

It would be helpful if the authors could put the importance of their study in context with results from other studies that have looked at wood smoke (see : Boman Scand J Work Environ Health. 2003 Aug;29(4):251-60). Specifically, in the introduction section of the paper, a statement as to what this study adds above and beyond other previously published studies would be helpful.

Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct)

Abstract

- the assignment of air pollution on a daily level is critical to this study; the author should better describe how daily levels were assigned in the methods section of the abstract
- results: some specific findings show be presented in the abstract to the reader can gauge the magnitude of effect and statistical significance of the study's key findings
- conclusions should acknowledge limitations of exposure data i.e., exposure to PM was not measured, but rather predicted from other variables with a modest level of correlation

Discretionary Revisions (which are recommendations for improvement but which the author can choose to ignore)

- I'm unsure of the value of presenting age specific population counts and proportion of visits under the age of 15 when no age-specific analyses are performed.
- in tables, authors use the term PROPORTION in the titles, but present PERCENTAGES (Table 1, 3)
- table 4, is the influenza a rate per day or week? (in the text, I believe they mention it was calculated on a weekly basis)
- table 3 would be much more informative if the denominator (population) information for Indigenous and Non-indigenous groups were presented.
- Figure 2. The title is somewhat misleading. The line and dots, in themselves, I feel does not validate the use of the predictive model to do time series analyses for PM10. Really, it is the fitting of a straight line which would represent the predicted values. The authors might also wish to present the prediction (not confidence) intervals of the PREDICTED values, and footnote the model coefficients under the figure.

**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 importance in its field

**Quality of written English:** Acceptable

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