Reviewer's report

Title: Impact of air pollution on pulmonary function and respiratory symptoms in children during different seasons of the year. A cohort study.

Version: 1 Date: 18 June 2009

Reviewer: Robert Chapman

Reviewer's report:

MAJOR COMPULSORY REVISIONS

1. This study assessed ambient air pollution health effects in children in 2 schools with different gaseous air pollutant exposures in Salamanca, Mexico. Beyond this, the main purpose of the study, and of the analysis, are not clear. The title suggests that the main purpose was to assess seasonal between-schools differences in prevalences and lung function in relation to seasonal differences in ambient air pollution levels. However, no formal assessment of this topic is reported. Instead, in separate tables and figures, the authors show seasonal differences in pollutant levels and in some outcomes. The reader cannot determine from this information whether seasonal differences in pollution levels and outcomes were related.

The main analysis actually assessed overall associations of outcomes with gaseous pollutant levels, and with school, after adjustment for season and other covariates. There were limited associations of outcomes with levels of one or more gaseous pollutants. The reader also suspects that associations of outcomes with school were generally stronger than those with specific pollutants, although clarification on this point is needed. If this was the case, might this observation have been partly attributable to unmeasured between-schools differences in particulate matter?

On balance, the authors tend to confuse changes in seasonal differences with adverse effects of ambient air pollution. To resolve this confusion, the authors should make a clear decision as to the main purpose of the manuscript, then analyze data and present findings accordingly. If the main purpose is to assess seasonal differences in outcomes vs. those in pollution levels, this issue should be more incisively and formally assessed than in the current manuscript. Such assessment should consider the possibility that apparent seasonal differences in outcomes were more apparent than real, and should include tests whether seasonal differences differed significantly from each other. If the main purpose is to evaluate overall associations of outcomes with pollutant levels, the title should be changed accordingly, and material on seasonal differences should be reduced and subordinated to material that relates to overall associations.

2. Some statements in the manuscript are incorrect or inconsistent. For example, it is stated on page 9 that prevalences differed significantly by school. The
manuscript states that according to the ISAAC questionnaire, prevalences of asthma, rhinitis, and eczema differed significantly between schools. However, table 1 shows no significant differences in baseline prevalences or lung function tests.

3. In several ways the discussion does not follow from the findings. For example, the discussion contains a strong recommendation for reducing air pollution exposure. This does not follow from the observed limited and inconsistent associations of outcomes with air pollution. Also, the discussion states that ozone, alone or in combination with SO2, can oxidize lung tissue, presumably thereby causing lung tissue damage. However, although ozone was negatively associated with lung function levels, it was evidently generally negatively associated with prevalences. Also, SO2 was not significantly associated with prevalences. Such inconsistencies should be resolved.

4. Presentation of findings for prevalences is not consistent with that for lung function. For example, the methods section states that covariates and data hierarchy were similar in models for prevalences and lung function. However, the suites of variables shown in tables 4 and 5 are very different. Most important, all gaseous pollutants are shown in table 4, but only ozone is shown in table 5. This difference should be justified or eliminated.

5. One of the entries in table 4 is season. Should this be school? If season is correct, how was the season variable constructed? Was it an ordinal variable or a factor? An ordinal variable would have been inappropriate. If it was a factor, what do the coefficients mean? If school is correct, what was the reference school? Also, if school is included in table 4, why is it not included in table 5?

6. It is stated that children were 6-14 years old, and that the questionnaire was adapted from the ISAAC questionnaire. It also appears that questionnaire respondents were always children. In the ISAAC studies the parent answers for younger children and older children answer for themselves. In the present study, I am skeptical as to whether the younger children were able to answer the questions accurately. Potential inaccuracy in this regard should be identified and discussed.

7. In table 2, units of gaseous criteria air pollutants are incorrect. These units could not possibly be ppm. Also, I presume that NOx was the sum of NO and NO2. If so, the 14.0 given as the NOx level at school 2 seems low. This should be checked. It would be best to give standard deviations for all metrics in this table. Also, if the main purpose of the manuscript is to examine seasonal differences, season-specific pollutant levels should be given.

8. Table 4 omits results for 3 of 7 illness and symptom prevalences, and for prevalences of lung function deficits. Reasons for these omissions are not at all clear. The reader suspects that the omitted prevalences were not associated with any pollutant or with school. Clarification on this point is needed.

MINOR ESSENTIAL REVISIONS
1. In table 5, it is somewhat unexpected that asthma was as strongly associated with reduced FVC as with reduced FEV1. What were the units of the coefficients? For example, FEV1 could not possibly have increased by 1.94 liters per year of age. If the model really predicted this, then something is wrong with the model. Also, it seems very unlikely that in these children, asthma would have been associated with 1.94 and 1.72 liter reductions in FEV1 and FVC, respectively.

2. Terminology is often inconsistent, and some terms are never defined. For example, table 3 refers to "respiratory difficulty," whereas figure 3 refers to "dyspnea." Similarly, table 3 refers to "rhinorrhea," whereas table 4 refers to "rhinitis." Also, "mixed pattern" and "restrictive types" of lung function deficit are not specifically defined.

3. Methods used to measure air pollutant levels should be given.

4. The title calls this a cohort study. Something like "longitudinal repeated-measures study" would be better.

5. In figure 3, the legend font is nearly impossible to read, and should be changed.

6. In the footnote of table 1, change "hoped" to "predicted."

DISCRETIONARY REVISIONS

1. It would be desirable to clarify the rules used to select lung function tests for inclusion in analysis.

2. In table 4, what do the hyphens after "NS" mean? Should they be omitted?

3. Numbers of decimal places used should be consistent in all tables.

Level of interest: An article of importance in its field

Quality of written English: Needs some language corrections before being published

Statistical review: Yes, and I have assessed the statistics in my report.

Declaration of competing interests:

I declare that I have no competing interests.