Author's response to reviews

Title: Chronic effects of ambient air pollution on respiratory morbidities among Chinese children: a cross-sectional study in Hong Kong

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Author's response to reviews: see over
Dear Dr. Dalumpines,

Thank you for your e-mail dated the 31st October, 2013 offering us the opportunity to revise our manuscript. The article has now been revised according to the referees’ comments point-by-point as contained in this letter.

Thank you very much for considering the publication of this manuscript. We look forward to your advice.

With best wishes,

Yang GAO
Reviewer: Mukesh Dherani

1. Title: Title need to be more reflective of the population. It is Chinese population from Hong Kong.

Our response: we have revised the title to exactly reflect the study population. The current title is: “Chronic effects of ambient air pollution on respiratory morbidities among Chinese children: a cross-sectional study in Hong Kong”.

2. Methods: (essential revisions) - What are the cut off points for choosing LPD, MPD, and HDP?
3. How the three of the ten districts were chosen? Random or convenient sampling?

Our response: we have revised the first paragraph in the Methods section to clarify how to select study districts according to your comments. Below is the revision:

“three districts, labelled as low-pollution district (LPD), moderate-pollution district (MPD) and high-pollution district (HPD), were then selected from ten districts with urban general air monitoring stations based on the rank of their annual means for PM$_{10}$ over the previous 10 years: LPD and HPD were the districts with the lowest and highest PM$_{10}$ values respectively. While MPD had an annual mean for PM$_{10}$ nearest to the average in LPD and HPD.”

- Similarly, please state how the selected schools were chosen from all the schools of the district?

Our response: we have revised the first paragraph in the Methods section to clarify how to select study schools according to your comments. Below is the revision:

“Three or four primary schools in each district, which are located within 1 km from the local air monitoring station, were invited to participate into the study using the “the closest to the station, the first to be selected” criterion. In addition, schools with any factories/industrial plants within a 100-meter range were excluded from the study to avoid the influences from point pollution sources.”

- Why only Chinese ethnicity was a selection criteria? It may limit the generalisability of the study
Our response: Only Chinese students were invited to participate into the study, this is because our questionnaires are in Chinese. We have acknowledged the limitation caused thereby in the last paragraph of the Discussion section as the followings:

“In this study, we only recruited Chinese students. Overall, less than 1% of students in Hong Kong mainstream primary schools are non-Chinese. However, our results are unable to reflect the situation of non-Chinese children.”

In addition, we have also revised the selection criteria for participants in the first paragraph of the Methods section as the followings:

“All Chinese students in grades three and four were invited into the study as the questionnaires were only in Chinese. In order to reduce exposure misclassification, only students who had been currently living in the district where their school is located for more than 12 consecutive months prior to the study were selected for data analysis.”

- Please state the significance of chosen age group.

Our response: Very few students in this study were under 8 or above 10 years old (3.4%, n=89). Very low percentage in one or more categories of an independent variable would threaten the robustness of the multivariate logistic regression; we therefore excluded them from data analysis. We combined children under 8 into the 8-year-old group and those above 10 into the 10-year-old group, and then performed multivariate analysis again. Results were similar to those we presented in this manuscript. We have made the following revision in the first paragraph in the Methods section:

“In addition, only children aged 8-10 were included into data analysis as few students (3.4%) were beyond this age range.”

Statistical analysis: (suggestion)
- Were there homes using biomass fuels such as wood, crop residues for cooking. Given, Hong Kong this is unlikely, as mentioned therefore, title should be reflective of this.

**Our response:** Hong Kong is one of well-developed cities in China. The major types of fuels are town gas, Petro gas, and electricity. In this study, only one student reported using fuels other than these three at home. We have revised the title into “Chronic effects of ambient air pollution on respiratory morbidities among Chinese children: a cross-sectional study in Hong Kong” to reflect this.

Results:
- Please provide justification of stratification of results by gender. You may have used sex an interaction term

**Our response:** Some previous studies have suggested that there might be gender-specific differences in health effects from exposure to ambient air pollution [28-30]. We therefore planned to examine if there were gender differences existing in our participants. We performed multivariate analysis both before (gender was put in the models to control for) and after stratification by gender. However, we finally decided to present our results after stratification by gender because:-- by doing so, we can not only know which gender, boys or girls, would be at elevated risks for respiratory morbidities, but also know the risk size (ORadj.) in each gender.


- Why age was adjusted for when it was restricted only to 8-10 years?

**Our response:** In this study, prevalence rates of some respiratory morbidities were significantly different across ages (chi-square tests), we therefore adjusted for age in the multivariate analyses. For example, chi-square test for current asthma (P=0.04); chi-square for life-time allergic rhinitis (P<0.001).
Discussion:
- On page 11 at one point you describe PM10 responsible for respiratory morbidity in your study and later mention PM10 to be regarded as pollutant indicator rather than pollutant itself. It is now clearly recognized that PM are pollutants.

Our response: We have revised our manuscript and removed the word of “indicator”.

Level of interest: An article whose findings are important to those with closely related research interests

Our response: we are very grateful for your positive comment.

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

Our response: we have requested a native English-speaking colleague to proofread the revision.
Reviewer: Xiao-chuan PAN

Major Compulsory Revisions#

1. Methods: Page 4, last 4 lines: the selection criteria for the subject is "living for more than 12 months in the district", used 10 years air pollution data annually. But the subject children may live in the subject district in different years, i.e. different exposure time and level to air pollution. So the subjects should be stratified by living years (exposure years) for analysis.

   Our response: Thank you very much for your precious comments. The length of residential time may be a confounding factor, which should be adjusted for in the multivariate analysis. Unfortunately, we did not collect such data and therefore are unable to control for. We have acknowledged this as a limitation of our study in the last paragraph of the Discussion section as the followings:

   "The length of residual time of the participants may affect the associations between air pollution and respiratory morbidities, especially for life-time diseases. However, we did not collect such data, and therefore could not control for its influence. If students in HPD had ever lived a less polluted district than HPD, and/or students in LPD had ever lived in a more polluted district than LPD, the health risks of air pollution in this study might have been underestimated, and vice versa."

2. Statistical analysis: What are the "dependent variable" and what are the simple size for each variable? it should be described.

   Our response: we have described dependent variables as the followings:

   "Multivariate logistic regressions were fitted to estimate the risk of air pollution (independent variable, indicated by district) for respiratory morbidities (dependent variables) after adjustment for other confounders."

   In addition, we have added sample size of each variable into Table 2.

3. results: the difference of air pollution level in LPD, MPD and HPD seems not significant statistically, so its association with health effects of the schoolchildren were uncertain.

   Our response: we acknowledge the differences in air pollution levels across the three study districts are small, which we had discussed in the last paragraph of the
Discussion section. The small difference in air pollution levels across districts is inherent in Hong Kong nowadays, as all districts with an urban monitoring station possess both residential and commercial functions. No district functions as an industrial district, as almost all industries causing heavy air pollution were moved out in the 1990’s. However, we have still observed slight but significant differences in some respiratory morbidities. For example, girls in HPD were at significantly high risk for cough at night, compared to those in LPD.

4. "We hypothesised that air pollution in the past 12 months would have major influences on occurrences of respiratory morbidities in the same time period"? what is scientific evidences?

Our response: Historical exposure to air pollution may be more likely to have influences on life-time respiratory diseases than current symptoms and current diseases. Whilst current exposure may have contributed more to the health effects on current morbidities, though accumulated health effects from historical exposure may also play a role. We have revised this sentence to make it clearer, as the followings:

“We hypothesised that exposure to current air pollution (in the past 12 months) would have more influences on current respiratory symptoms and diseases (in the past 12 months), compared to historical exposure.”

Minor Essential Revisions
1. the table 3,4 should be improved.

Our response: we have revised tables 3 and 4.