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CORRESPONDENCE

Daily respiratory mortality and PM10 pollution in Mexico City

From the authors:

We would like to thank FILLEUL *et al.* [1] for their thoughtful comments on our paper [2] which discusses some limitations of time-series analyses.

The main objective of our study was to evaluate the impact of air pollution on respiratory mortality accounting for primary and underlying causes of death, as accounting for primary causes only may underestimate the real impact of air pollution on respiratory death. We also aimed at obtaining a better specification of individual exposure by stratifying by place of death; the rationale being that the relationship between air pollution and death should be more apparent in subjects dying outside of medical units. Our data show that by considering these two factors, we were able to better capture the impact of air pollution on respiratory health.

FILLEUL *et al.* [1] are suggesting that several factors may have affected our results and they present alternative explanations that may have distorted the results of our comparison between death within and outside of the medical unit.

The authors mention that the difference of effect we observed between subjects, dying in and outside of medical units, is related to the fact that by stratifying by place of death, we are looking at the effect of air pollution among populations with different susceptibility. One can speculate that individuals dying outside of medical units may be more susceptible to air pollution because of nutrient deficiency, concomitant exposure to other environmental factors or concomitant disease. Unfortunately we do not have a simple way of looking at this, given that the death certificates do not provide information on socioeconomic status. If what FILLEUL *et al.* [1] mentioned is true, our results would suggest an effect modification of socioeconomic status on the impact of air pollution on mortality.

These authors also mentioned the fact that the existence of certain concomitant illnesses such as cardiovascular diseases may affect the probability that an individual died in a hospital. We reviewed the distribution of underlying cardiovascular and neurological causes of death for subjects dying in and outside of medical units and found a similar proportion in both groups, suggesting that this did not affect our results (50.43% of deaths within a medical unit had an underlying cardiovascular diagnosis *versus* 49.57% of deaths outside of a medical unit, and 49.95% of deaths within a medical unit also had a neurological disorder *versus* 50.05 of deaths outside of a medical unit).

With respect to the difference in results at lag 5, we do not think that the small number of chronic obstructive pulmonary disease (COPD) deaths may explain this difference, because a small number of cases would have affected all the estimates and not only the effect of lag 5. In our study, we had a total of 20,669 deaths: 4,919 deaths were from respiratory causes and 2,294 deaths from COPD. The mean daily number of deaths from respiratory causes were 13 and six for COPD.

It is clear that having data from only 1 yr limits our ability to control time trends. However, as mentioned earlier, one of the goals of our work was to consider primary and underlying causes of death in order to obtain a better estimate of the impact of air pollution on respiratory mortality. This required the revision and capture of the different causes of deaths and associated illnesses on death certificates. This is the reason why our study includes data for only 1 yr.

We agree that, to date, results concerning the impact of air pollution are not clear with respect to the time factor. However, recent work has shown that "harvesting" is not a likely explanation for the effect of air pollution [3].

Finally, we believe that our paper strengthens the epidemiological evidence for an acute adverse effect of air pollution in mortality. We agree with FILLEUL *et al.* [1] that a case-crossover analysis of the data could provide additional information by using individual data, because this design reduces the possibility of confounding associated with time-dependent covariates such as temperature, humidity and other pollutants.

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