Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Reduction in air pollution and attributable mortality due to COVID-19 lockdown

Lockdown measures reducing the transmission of COVID-19 have led to a temporal improvement in air quality worldwide. An assessment by Kai Chen and colleagues[1] reported that a drop in air pollution in 367 Chinese cities was associated with 8911 prevented deaths because of a reduction in nitrogen dioxide (NO_2; 95% CI 6950–10 866) and 3214 deaths from a reduction in $PM_{2·5}$ (95% CI 2340–4087). However, the method for quantifying reductions in air pollution and attributable mortality is on the basis of several simplifications and assumptions that are likely to bias the estimates.

First, air pollution reductions estimated with the difference-in-difference approach cannot be directly attributed to the lockdown because this method does not cancel out the effect of weather on air pollution. To show this point, we estimated the change in NO_2 during lockdown in 48 Spanish provinces, from March 15 to April 23, 2020, by estimating business-as-usual concentrations with a meteorology normalisation technique based on machine learning,[2] which shows the expected concentrations that would have occurred without lockdown. We then used exposure-response functions[3,4] to transform the daily observed and business-as-usual NO_2 time series into daily NO_2-attributable mortality time series, and the difference was compared with estimates obtained with the method in Chen and colleagues.[1] Our unbiased method increased the reduction in NO_2 by 11% on average and increased the reduction in attributable deaths by 6·5%. Depending on how anomalous the weather was during lockdown and the reference periods in each of the Chinese cities, the bias could be even larger.

Second, the baseline mortality used by the authors to quantify the temporal reduction in number of deaths is from 2018. The choice of this particular year is unjustified, and the use of data from one year can lead to biases in the estimates, particularly for cause-specific mortality. In addition, Chen and colleagues[1] used different sources of data for the calibration of historical exposure-response models and the estimations of the reduction in air pollution, which could lead to large biases because of inconsistent choice of air pollution stations.

Finally, the authors state that "the COVID-19 outbreak led to improvements in air quality that brought health benefits in non-COVID-19 deaths". We would like to raise a note of caution, given that some of the prevented deaths might correspond to the oldest and frailest individuals whose death was brought forward by just a few days or weeks, or correspond to those individuals whose health is at risk given that air pollution in China has already exceeded concentrations before the crisis.[5] In our opinion, improvements in air quality will result in a long-term benefit only if they are sustained in time.

We declare no competing interests.

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