

Long-term exposure to ozone has significant impacts on human health

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A new study has utilized a novel method to estimate long-term ozone exposure and previously reported epidemiological results to quantify the health burden from long-term ozone exposure in three major regions of the world.

The research, by Duke University (USA) and the University of York (UK), estimates that 266,000 (confidence interval: 186,000-338,000)

premature mortalities across Europe, the USA and China in 2015 were attributable to long-term [exposure](#) to ozone (O₃).

It publishes today in *Environmental Research Letters*.

Karl Seltzer, from Duke University, is the study's lead author. He said: "There is strong epidemiological and toxicological evidence linking ambient [ozone](#) exposure to adverse health effects.

"Historically, much of the previous research focussed on the short-term impacts. We utilized results from the growing body of evidence that links long-term O₃ exposure and increased cause-specific premature mortalities, particularly from respiratory diseases."

To do this, the researchers used 2015 data from ground-based monitoring networks in the USA, Europe and China to estimate long-term O₃ exposure. They then calculated premature mortalities using exposure-response relationships from two American Cancer Society (ACS) cancer prevention studies.

Mr Seltzer said: "Global estimates of O₃ exposure are often made using state-of-the-art chemical transport models (CTMs). However, we based our study on observed air quality data, because it has several advantages over CTM modelling approaches."

Interestingly, the team's observationally-derived data shows smaller human-health impacts when compared to prior modelling results.

Mr Seltzer explained: "This difference is due to small biases in modelled results. These small biases are subsequently amplified by non-linear exposure-response curves. This highlights the importance of accurately estimating long-term O₃ exposure in health impact assessments. The overall findings from this study have important implications for policy

makers and the public, for several reasons.

"First, health impacts attributable to long-term O₃ exposure are higher when using the newest ACS CPS-II cohort analysis. Plus, the impacts are expanded further if the association between long-term O₃ exposure and cardiovascular mortality is indeed shown to be causal and included in the total health burden estimates.

"Second, results from the newest ACS CPS-II cohort analysis suggest that O₃ exposure should be considered year-round. This is particularly relevant for the three regions included in this analysis, where the seasonal cycle and regional distributions of O₃ have shifted over the last few decades."

"Finally, these results also highlight the importance of accurately estimating O₃ exposure and the consequences of high exposure bias in estimating impacts for health assessments."

More information: Karl M Seltzer et al. Measurement-based assessment of health burdens from long-term ozone exposure in the United States, Europe, and China, *Environmental Research Letters* (2018). [DOI: 10.1088/1748-9326/aae29d](https://doi.org/10.1088/1748-9326/aae29d)

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