

## **Reply to Reviewer 1**

*I found the paper highly interesting and well researched. I would only put forward to minor comments:*

*1) In line 123, Gunnlaugsson and Rafnsson should be put within brackets, otherwise it sounds like they are the officials in question.*

Thanks, corrected.

*2) Why is the article by Casey et al. from 2019 not cited? (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6456407/>). This is not my field, but it looks like you might want to include it in the discussion.*

The paper by Casey et al. contains rather dubious results.

In particular, the reported mortality rates are totally off the mark, as they claim that “annual male infant mortality rate [in Sweden] ranged from 5 to 19 per 1000 (mean = 7, SD = 2) and the annual female infant mortality rate from 4 to 19 per 1000 (mean = 6, SD = 2)”, while in reality the infant mortality in Sweden fluctuated between 163 and 285 deaths pr. 1000 births. We consulted two specialists of 18<sup>th</sup> century demographic history in Sweden, and they both agreed that the data in the article made no sense. In comparison, the lowest infant mortality rates recorded for Iceland before the 1890s were around 200 per 1000 births. This alone makes us doubt the validity of the study – either there is something wrong with their data, or the data are represented in a confusing manner inviting misunderstanding of what the authors mean.

In addition, if pollution in the summer of 1783 indeed affected gender-dependent birth outcomes, one would expect to see already some effect in 1783, stemming from the children born in the last months of that year, particularly as some studies suggest that such effects mostly occur in case of exposure in the second trimester of pregnancy.

As an additional check on male/female birth ratio, we computed this ratio for our Icelandic data set, with the following outcomes:

- Fraction of male births, 1769-82: mean 50.22% of all births (lowest value: 47.69% in 1772; highest: 52.76% in 1777)
- Fraction of male births, 1783: 50.69%
- Fraction of male births, 1784: 52.63%
- Fraction of male births, 1785: 48.84%

In other words, the fraction of male births in 1783-84 was slightly higher than normal (not lower, as suggested by Casey et al. for Sweden), but within the range of fluctuations of the previous years. Of course the numbers from 1784 onward could be confounded by possible effects of famine (which were absent in Sweden), but the 1783 value also does not suggest a relevant effect for pollution, despite the fact that pollutant concentrations were much higher in Iceland.

Given that the paper’s results are clearly unreliable, we decided not to discuss it in our article.