Cover Letter

25 May, 2021

To the Editor:

Please find attached the paper titled "The importance of reproducibility in COVID-19 research: the case of population density and the spread of the pandemic". The paper illustrates the importance of reproducibility in research in the particular context of COVID-19. Research on population density and the spread of COVID-19 has been published in Science of the Total Environment (see Sharifi and Khavarian-Garmsir, 2020; and Sun et al., 2020).

The present submission includes some original research, since in it I reanalyze data from a recent paper (Sy et al., 2021, published in PLoS ONE) and show that after taking into account sample selection the conclusions are drastically different. I think, however, that this paper is better classified as a "Discussion", since the reanalysis is the motivation for a broader discussion about reproducibility in COVID-19 research, and an example of how openly sharing data and code can accelerate research.

This paper makes the following contributions to the literature:

1. It reviews the emerging literature on the relationship between population density and the spread of COVID-19.
2. It shows that reproducibility in this literature remains an elusive goal.
3. It reanalyzes the data of Sy et al., and demonstrates that a different technical approach can lead to substantially different conclusions from those reached by the original analysis of Sy et al.
4. The reanalysis and reappraisal of the conclusions in a matter of weeks demonstrates the importance of reproducible research.
5. Finally, the paper provides an example of a reproducible research project, with extensively documented workflows, from raw data processing, to modelling, and post-modelling outputs. The source document is an R Markdown file, a self-contained document with the text and *all* the analysis. These materials are publicly available in a repository, as indicated in the paper.

I trust that you will find that the paper is technically correct, and suitable for publication.

Sincerely,

Antonio Paez