

Peer Review Report

Review Report on Time-trends in air pollution impact on health in Italy: an analysis from the Global Burden of Disease Study 1990–2019

Original Article, Int J Public Health

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Submitted on: 12 Apr 2023

Article DOI: 10.3389/ijph.2023.1605959

EVALUATION

Q 1 Please summarize the main findings of the study.

The manuscript explores the results made available online by the GBD 2019 study for time trends in air pollution health impacts in Italy. The source data presents estimates for exposures, background population health status and deaths and burden of disease attributable to PM_{2.5} and ozone air pollution from 1990 to 2019.

Q 2 Please highlight the limitations and strengths.

The authors have obtained all the used inputs from the data made available by GBD 2019 study using extrapolation methods and very subjective modelling techniques including bi-annually changing choice of exposure response functions (two iterations of IER followed by GEMM and then current MR-BRT) and radical levels of cut-off (currently labelled confusingly as TMREL, partly justified by counterfactual exposures; the importance of this element is correctly discussed on line 319).

The GBD 2019 study does not account for any changes in the composition of air pollution or the composition of particles, which are very likely to have changed rather substantially during the covered 30 years (1990–2019). Thus, while very relevant and important work, the results are subject to uncertainties in capturing the changes population health and exposures. The attributable health effects are then calculated using the particle mass only, not taking into account the changes in population time-activity, building stocks, particle size distribution or chemical composition etc. Thus the whole approach is assuming: »...that the personal exposure to ambient air pollution ratio and the toxicity of ambient PM_{2.5} have remained constant...»

Q 3 Please provide your detailed review report to the authors. The editors prefer to receive your review structured in major and minor comments. Please consider in your review the methods (statistical methods valid and correctly applied (e.g. sample size, choice of test), is the study replicable based on the method description?), results, data interpretation and references. If there are any objective errors, or if the conclusions are not supported, you should detail your concerns.

Generally speaking it would be useful to present population age structure and its change during the study period as well GBD2019 exposure estimates for background of the current work (e.g. in Supplement).

Line 22 suggests that the observed reducing trend in air pollution burden of disease is due to air quality regulations; this seems not to have been proven in the current work! Consider rephrasing. “... despite population ageing” - population ageing should be added to the manuscript.

Line 124 “Age-standardized rates were computed 125 through a direct standardization, using GBD 2019 World Standard Population as a reference”

Note: It would be interesting to understand how the global standard population relates to the actual age profile of Italians! Because the global standard population is likely to have substantially large fraction of

younger generations included, it may actually be so that the crude estimates (e.g. Fig 1) are closer to the rates observable in Italy than the age-standardized ones (which are shown to be substantially lower).

Line 13 “age standardized rates” of what? specify. “Burden” is measured by partly overlapping measures of deaths, YLL, YLD and DALY.

Line 227 “level four risk factors” unclear; please clarify

308 “highly standardized methods” is an overstatement regarding PM2.5 air pollution estimates; since 2012, when the first GBD work (2010) was published, almost every iteration of the assessment has come with a new exposure–response function for particles; from IER (2 iterations) to GEMM to MR–BRT used in the GBD 2019 and the differences between these ERF have been numerically extensive and partly badly documented. Thus the quoted opening towards this topic is misleading and straightforwardly incorrect. (it may be more true towards estimation of the background burden rates, population age structures etc.)

Subsequent text, referring to Ostro et al. [46], talks about IER, which was not used in GBD 2019 anymore, replaced by MR–BRT. While the above topic is partly covered correctly by Ostro, the naming of the used exposure response functions should be consistent with the use in GBD publications. Ostro’s paper, published in 2018, concerns the earlier iteration of GBD studies (even though the elements raised from there are fully relevant for the MR–BRT used in GBD2019 study, too).

Line 327 “our study observed” is false statement and nothing was observed in the study; the input data were extrapolated estimates made elsewhere (not observed there either) and this paper merely summarized those extrapolations for Italy. Also, “providing evidence of the beneficial effect on air quality regulations” is incorrect; extrapolated estimates can be taken as confirmatory, but not as “evidence”. These sentences should be reformulated not to give a false impression of observing or having evidence. The values shown are estimates that would need to be evaluated against observations to generate evidence.

Line 327 it would be helpful to add “in Italy” into the opening of Conclusions (similar also for Results section)

Line 333 “stewardship-oriented regulations” need clarification (not mentioned elsewhere; cannot introduce new concepts in Conclusions)

Figures 2 and 4–5 “percent variation” is an odd term for change (variance in statistics is a parameter always positive and representing variability, not change along trend, which is now in question). The term must be revised; consider e.g. mean change [per year? temporal scope must be clarified, too!]. What do the whiskers represent?

Describing the change in terms of Global standard population age structure is problematic; more relevant standardization might be to use Italian standard or European standard population. Towards understanding the large difference between crude and age standardized values it would be useful to consider presenting the age structure and change during the study period e.g. in a supplement.

Fig. 3 Line 491 Using “*” both as foot note indicator as well as multiplication symbol on y–axes labels adds a bit confusion. Footnote stating that shown DALYs contain only YLL component adds confusion; better just to show YLL on y–axis label instead of DALY. Each figure and table would need to specify “in Italy” in the caption.

PLEASE COMMENT

Q 4 Is the title appropriate, concise, attractive?

Yes

Q 5 Are the keywords appropriate?

Yes, except air quality regulations, which are not at all covered by the manuscript

Q 6 Is the English language of sufficient quality?

Yes

Q 7 Is the quality of the figures and tables satisfactory?

Yes.

Q 8 Does the reference list cover the relevant literature adequately and in an unbiased manner?)

Yes

QUALITY ASSESSMENT

Q 9 Originality



Q 10 Rigor



Q 11 Significance to the field



Q 12 Interest to a general audience



Q 13 Quality of the writing



Q 14 Overall scientific quality of the study



REVISION LEVEL

Q 15 Please make a recommendation based on your comments:

Minor revisions.