Peer Review Report

Review Report on Gender/Sex Disparities in the COVID-19 Cascade from Testing to Mortality: An Intersectional Analysis of Swiss Surveillance Data

Original Article, Int J Public Health

Reviewer: Federica Rossetti
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EVALUATION

Q 1 **Please summarize the main findings of the study.**

The study investigates gender differences in COVID-19 epidemiology in a specific Canton in Switzerland, adopting an intersectional approach (gender intersected with age and with socio-economic position). The findings show that when looking at the effects of these intersecting characteristics, women aged 60 and above were less likely to test positive, had lower risk of ICU admission and lower likelihood of death compared to men. Looking at the intersection between gender and SEP, women with lower SEP had lower mortality risk compared to men with same SEP.

Q 2 **Please highlight the limitations and strengths.**

The authors highlight two major strengths of their study: (1) the use of neighborhood-based SEP indicator to identify possible individual and contextual-level effects on their outcomes; and (2) the use of comprehensive surveillance data for the Canton of Vaud population, which minimizes selection bias.

Regarding limitations, the authors states four shortcomings: (1) the absence of relevant information at the individual level such as migration status or ethnicity; (2) potential under-reporting of hospitalization and ICU admission data due to challenges associated with the identification of primary causes of hospitalization; (3) untested deaths outside clinical settings; and (4) potential biases in the lifelong SEP, which could be different from the Swiss-SEP indicator used by the authors.

I do not have any major comments regarding the strengths. Concerning the limitations, I would suggest the authors to reflect on the use of the Swiss-SEP as individual-level characteristic. Are there other potential biases (other than the potential inaccuracy of lifelong SEP) that could affect the categorisation of participants in one quintile versus another quintile?

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.**

The study highlights the need to adopt an intersectional approach in understanding the impacts of COVID-19, and this certainly represents a major contribution to the field, given the complex relation between social determinants of health and the urgency to develop strategies for future pandemic (or crises) preparedness. However, there are a few major issues that the authors should consider at this stage. These issues concern the use of 'gender/sex' term, the specification of the SAGER guidelines, and the concept of intersectionality.

Major comments:

First, concerning the use of 'gender/sex', the authors state that "from a methodological perspective, this gender/sex variable serves as a proxy potentially capturing both gender-related aspects (e.g. behaviors) and

sex-related biological factors (e.g. hormonal variations) effect on the outcomes of interest" (methods section, p. 3, lines 101-104). While it is true that sex and gender are intertwined (Morgan et al., 2021 – also cited by the authors), I think that the manuscript would benefit from an additional explanation on the different impacts of sex and gender on the outcomes. Gendered behaviours and roles can influence infection and exposure risk (Morgan et al., 2021). For example, women are more likely to work in healthcare sectors, and thus were more exposed to the risk of COVID infections (Connor et al., 2020). On the other hand, the effect of biological sex on COVID is different, with men being more susceptible to develop severe outcomes than women (as stated by the authors in the introduction and discussion).
I also find somewhat unclear the specific methods used by the authors to collect data on 'sex' and/or 'gender' of respondents. It is mentioned in lines 99-101 that "This terminology also aligns with our use binary "women/men" categories, which could correspond to administrative sex or to reported gender identity, depending on the notification form process used for data collection." I do think that the way the information was collected could indicate whether it was sex or gender identity, and this in turn might have an impact on the use of the term(s) throughout the analysis. I suggest the authors to specify the methods used to collect sex and/or gender and, consequently, to use one term or the other.

Second, the authors state on p. 4 (lines 134-135) that "This research aligns with the Sex and Gender Equity in Research (SAGER) guidelines". I suggest the authors to provide more information on these guidelines for those who are not familiar with the topic. For example, the guidelines state that the "Authors should report, where relevant, whether sex and/or gender differences may be expected."; or that "The potential implications of sex and gender on the study results and analyses should be discussed." (Heidari et al., 2016, Table 1). These points relate to my previous comment on the collapsed terms 'gender' and 'sex' into one term. The study would benefit from the specification of how gender AND sex could have different impacts on the different outcomes. If the authors could not specify the two aspects, this should be clearly stated.

Third, I find that the concept of intersectionality could be more strongly emphasised in the introduction, and the implications of the use of this approach for public health research/policy could be further developed in the discussion or conclusions section.
Intersectionality is increasingly used in the field of public health, and especially during the pandemic this concept seems to have drawn the attention of public health scholars (see, for example, Bambra et al., 2021; or Maestripieri, 2021). Perhaps the authors could engage more with this literature and reflect on how their findings situate in this literature. It is interesting, for example, the results that women in 1st SEP quintile had reduced risk of mortality compared to men in the same quintile (also when looking at the triple interaction), which contrasts what you state in the discussion lines 257-258 ("Our findings are consistent with existing literature (1-5), highlighting the increased vulnerability of individuals residing in low SEP neighborhoods").

Minor comments:

I would recommend the authors to separate their conclusions section from the discussion section (i.e., lines 312-319) and to strengthen their conclusions (see previous point on intersectionality).

I think that a few specifications are needed when analysing the results. For example, lines 152-154, is it correct that 18% of men were categorized in the lowest quintile and 14% in the highest? Table 1 reports respectively 23% and 17%. I would check these numbers (also for women). In line 170 (p. 5), I would add that you are examining outcomes across SEP quintiles and gender.
Regarding the sensitivity analysis on all deaths notifications (Supplementary Table 7), it is unclear to me how you could use SEP quintiles as variables if the SEP attribution is imprecise (as you stated in the text above the table). This is also reflected in the manuscript (lines 219-221). If possible, you could use, for example, the level of education of people who died within institutions to look at the association between gender, socio-economic position (education used as proxy) and death. This would strengthen the results of your sensitivity analysis.

Line 99: I think there is a missing 'of' in the sentence ("This terminology also aligns with our use binary "women/men" categories").

I do not have any concerns regarding the methods, the statistical analysis looks appropriates.

References
Bambra, C., Lynch, J., & Smith, K. E. (2021). The unequal pandemic: COVID-19 and health inequalities. Policy Press.
Connor, J., Madhavan, S., Mokashi, M., Amanuel, H., Johnson, N. R., Pace, L. E., & Bartz, D. (2020). Health risks and outcomes that disproportionately affect women during the Covid-19 pandemic: A review. Social Science & Medicine, 266, 113364.
Maestripieri, L., 2021. The Covid-19 Pandemics: why Intersectionality Matters. Frontiers in Sociology, 6, 52.

PLEASE COMMENT

Q 4 **Is the title appropriate, concise, attractive?**

I would use either "gender" or "sex". This depends on what the authors would like to focus on and on which data the authors collected (see comment above).

Q 5 **Are the keywords appropriate?**

I have some doubts regarding the keyword "Gender and sex". I would use one of the two terms, depending on the term the authors would use in the manuscript (see comment in the section above).

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?)**

I would add a few references on intersectionality in public health, especially during the pandemic (e.g.:
Bambra, C., Lynch, J., & Smith, K. E. (2021). The unequal pandemic: COVID-19 and health inequalities. Policy Press.)

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:**

Major revisions.