Author’s response to reviews

Title: Decomposing socioeconomic inequality in dental caries in Iran: cross-sectional results from the PERSIAN cohort study

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Author’s response to reviews:

July 10, 2020

Editor-in-Chief,
Archives of Public Health
Dear Enrique Bernal-Delgado
Re: Re-submission of the manuscript, ID: AOPH-D-20-00165
Thank you for providing us with the opportunity to revise and resubmit our manuscript entitled “Decomposing socioeconomic inequality in dental caries in Iran: a cross-sectional result from the Persian cohort study” to Archives of Public Health. We are thankful to you and the reviewers for the valuable suggestions and comments on our paper. We find the review reports immensely useful to improve the quality of the article. We have revised the manuscript following the suggestions and feedback from the reviewers. Please find our responses attached to this letter.
We hope that you will find the revised version suitable for publication in your journal. If necessary, we would be happy to undertake further revision of our paper.

Sincerely,
Satar Rezaei, PhD
on behalf of the authors

# Reviewer reports:

Reviewer #1: Decomposing socioeconomic inequality in dental caries in Iran: a cross-sectional result from the Persian cohort study
Reviewer Comments
This paper explores socioeconomic inequalities in access to dental health in Iran and some of its provinces by using standard errors based on the concentration index. The topic of this paper is very relevant and interesting and the structure of the paper is good and easy to read. However, it needs some major methodological changes as I explain below.
Response: Thank you for this positive comment on our paper.

MAJOR COMMENTS
*Why are only some of the provinces included in the PERSIAN database? Also, are the data representative at the national or provincial level?
Response: The dataset used in the study were extracted from all of cohort sites in Iran and currently these cohorts are done in 15 provinces. Please see the appendix.

*Are there some expected differences across provinces (e.g. provincial income level?)
Response: We could not get the reviewer’s specific comment here, and we would be happy if we could get a hint to identify the area requiring improvement on this part. In addition, there are differences in DMF across provinces based on their SES where the provinces with higher SES has lower DMF scores and vice versa.

Response: Thank you for this good comment. However, the correction is needed when the outcome variable is binary (0 and 1) while in our study the dependent variable is DMF and it is continuous; thus, the correction is not needed. In two references mentioned, the outcome variable is binary and different from our outcome variable.

*P values are very informative and have not been reported
Response: We revised the paper as per this comment. Please see Table 3.

*I am not sure about aggregating in a single index data for Decay, Missing and Filled. Decayed and Missing are more concentrated among poor while Filled teeth are more concentrated among rich. Therefore it would be better in my view to analyse them separately or at most aggregate only data for Decay and Missing Teeth.
Response: Many thanks for this good and important comment. First of all, we should be mentioned that this index (DMF) is one of the popular criteria in oral health assessing and used by many papers that previously published in this context as follow:
1. Caries Process and Prevention Strategies: Epidemiology
   Epidemiology: The DMF Index
   Course Author(s): Edward Lo, BDS, MDS, PhD, FHKAM
After that we examined the socioeconomic-related inequality in oral health status based on D, M, F and DMF separately. Please see the Table 3 and Figures 1 and 2.

MINOR COMMENTS
*It is not clear why the adult sample is comprised of only individuals aged 35 years old and older
Response: The data for this age group are available in the dataset. The aim of the PERSIAN cohorts is to identify the status of non-communicable diseases and their risk factors among 35-year-old adults in Iran. In response to this comment, we added the following sentences in the last lines of the first paragraph of the Method section as per this comment (method section (study setting).
“The study population in the PERSIAN cohorts was adults aged 35 years and above. The aim of the PERSIAN cohorts is to identify the status of non-communicable diseases and their common risk factors among this age group”.

*It is not clear from the manuscript what year does the study refer to (2014)?
Response: we used the dataset of PERSIAN cohorts launched in 2014 and we stated this is a “since” term.
*The manuscript should be proofread as there are some typos throughout the text
Response: We have thoroughly edited the paper to correct for any typos and grammatical errors.
*In page 9, I think there is a mistake as the authors report higher DMFT score but it seems from the tables that is the other way around
Response: Thank you for your attention. Now it is revised following this comment.
*In page 2, the footnote appear to be mistaken (*p value more than 0.1 should be replaced by two stars)
Response: Thank you. The Table 2 was modified as per this comment.
*Maybe the discussion could also highlight the high impact that seems to exert the behaviour of individuals (smoking, drinking)
Response: The discussion part was modified as per this comment. Please refer to the last lines of the third paragraph in the discussion part.
*It could be interesting to explore nationality/ethnicity as a explanatory variable-
Response: We agree with this comment that the ethnicity or nationality have impact on DMF score but the data of this variable is not available in the dataset used in the study. Now we added this issue as one of the study limitations. Please see the last paragraph of the discussion part of the paper.
Reviewer #2: Summary of the Study

This paper investigates the relationship between socioeconomic status (SES) and measures of dental carries among adults in Iran at least 35 years of age. The data for the study is drawn from the Prospective Epidemiological Research Studies in Iran (PERSIAN). The primary outcomes are based upon the DMFT, a measure of decayed, missing, and filled teeth. A sample size of 128,813 respondents were collected from a total of 17 centers representing 14 overall provinces of Iran.

The authors estimated the SES using a principal components analysis based on a large number of granular measures related to assets, housing characteristics, and education. Then a concentration curve and relative concentration curve (RC) were calculated as a way of tracking the progression in DMFT relative to SES. Then a linear regression model was used to establish the association between DMFT (the outcome) and SES quintile while adjusting for age group, sex, marital status, smoking status, alcohol consumption, and province.

The model's results suggest a significant association between SES and DMFT. The respondents in the highest quantile of SES had approximately 3.9 fewer points on the DMFT relative to the lowest quintile. Each increasing quintile had roughly 0.8 to 1 fewer points, except the change from the second highest quintile to the highest was approximately 1.2. Meanwhile, the regression also showed that DMFT scores were higher for females, those who were married or divorced/widow relative to single, smokers, and those who consume alcohol. The provinces also demonstrated a wide range of variation in scores.

Based upon these findings, the study recommended greater emphasis in programs to address oral health in populations of low socioeconomic status.

Review of the Study

Overall the study is reasonably well designed and provides a clear progression from the research questions to the statistical analyses, results, and conclusions. The principal components analysis was justified based upon prior research that applies in this kind of setting along with the large
number of overall questions that were included in the data from the PERSIAN repository. The authors could provide greater detail about how these components were validated or why a more simple measure of socioeconomic status was not possible to utilize. (Did the original study more directly ask about this?)

Response: As per this comment, it should be mention that the PERSIAN cohort collected data on durable asset and housing condition to examine the socioeconomic status of the individuals in stead of income and it is very appropriate to measure socioeconomic inequality in health outcomes.

Ultimately the study could do more to emphasize some of the major findings apart from SES. For instance, the difference in DMFT between smokers and non-smokers (4.081) is larger than the gap between the highest and lowest quintiles of SES (3.933). The variation in the provinces is remarked upon in the discussion of Figure 2, but the results from the regression are perhaps even more dramatic, with effects in some provinces that are double the size of the effect of SES or smoking. Given the sample sizes, it may be worth investigating the SES effect in different provinces e.g. in Hormozgan and East Azerbaijan to get a better sense of the extremes.

Response: Thank you very much for this good comment. We agree with this comment and we included the province in the decomposition as explanatory variable. We also should mention that the RCx in the Table 5 shows the effect of SES provinces on inequality in DMFT. The association between oral health status and smoking status more explained in the discussion part of the paper.

Overall, it's not clear why the study was limited to adults at least 35 years old rather than also including younger adults.

Response: The data for this age group are available in the dataset. The aim of the PERSIAN cohorts is to identify the status of non-communicable diseases and their risk factors among 35-year-old adults in Iran. In response to this comment, we added the following sentences in the last lines of the first paragraph of the Method section as per this comment (method section (study setting).

“The study population in the PERSIAN cohorts was adults aged 35 years and above. The aim of the PERSIAN cohorts is to identify the status of non-communicable diseases and their common risk factors among this age group”.

Finally, there are a number of areas in which the paper would benefit from some additional editing to improve the quality and clarity of the writing. A few examples (not comprehensive) include:

Response: We have thoroughly edited the paper to correct for any typos and grammatical errors.

* Table's 4's caption: *P-value less than 0.05. *P-value more than 0.1

Response: Revised as suggested.

* Last sentence of the first paragraph of Discussion section: This cross-sectional study aimed to measured and decomposed socioeconomic-related inequalities in DMFT…

Response: Revised as suggested.

* First sentence of the Background section: (Addressing) Dental caries is considered an essential component of oral health and overall health(,) and poor oral health condition adversely affects the quality of lifes of peoples.

Response: Revised as suggested.

Overall, it is not surprising that socioeconomic status plays a large role in differential health outcomes related to dental caries. As a marker of additional health concerns, there is a clear case for additional support to address these issues. The study does help to identify populations (by
socioeconomic status, smoking, region, and demographics) that could benefit from greater interventions. Thank you for the opportunity to review this work.

Response: Thank you.