Reviewer’s report

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

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Reviewer: David Shilane

Reviewer's report:

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?)

Meanwhile, whether to incorporate SES as a quintile measure or in some other way (e.g. a numeric value) is a methodological question that may be further considered. The highest quantile of SES had a larger gap to the next highest quintile (1.2) than the 0.8 to 1 point gaps in the other ranges. Are there further increases within this highest quintile?

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 Hormazgan and East Azerbaijan to get a better sense of the extremes.

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

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:

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

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

* 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.

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.

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