Reviewer's report

Title: Inequalities in oral health among adolescents in Gangneung, South Korea

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Reviewer: Noha Gomaa

Reviewer's report:

This study assesses oral health inequalities among adolescents in Gangneung city in South Korea. The authors recruited 1267 participants from vocational and general schools, followed up for two years, after which they assessed the association between dental caries and SEP indicators, comparing baseline to follow-up. Assessing the determinants of oral health in an understudied rural population, particularly in adolescence is appreciated is of value and interest. It is important however, to take into consideration the study design, the analytical methods used in the current study and a number of points that need clarification, on which I have made the comments below, to help the authors with the revisions of their work.

Abstract:

- The abstract does not adequately reflect the methods used in the study, specifically in terms of the questionnaires used and outcomes assessed.

Background:

- Line 12 and 13: The authors state that "However, there are arguments for the existence of health inequality in a specific life stage, the youth." This is too strong of a statement in my opinion. While there are known health inequalities across all age groups, the argument may be that whether the pattern differs across age groups.

Methods:

- Was the dental examiner calibrated? Was intra-examiner reliability measured? Please clarify.
- Were the surveys used in the study validated? Please report on that.
The authors state that the schools included in the study were randomly selected. Please clarify how this randomization took place.

Was a sample size calculation conducted? The authors should elaborate on why they think (or not) their sample is representative of Gangneung's adolescent population.

The details of how the dental examination took place need to be elaborated on. For example, what kind of lighting and dental instruments were used? What kind of lesions were considered as carious?

It is not quite clear how the authors operationalized the outcomes used in the study. It is stated that dental caries was used as "any experience of decayed, missing or filled teeth", however there is reference to using untreated dental caries in the results section.

Using untreated decayed teeth would be more rational, especially for follow-up, since the authors consider receiving treatment as transitioning from yes (disease) to no (no disease). Therefore filled/treated teeth should not be included in the count of teeth with dental caries (i.e. DMFT should not be used) at baseline.

Similarly, if filled teeth is included in the "dental caries experience" count at baseline, this would affect the outcome at follow-up (as staying unhealthy), if the participant had the same number of filled teeth or more. I suggest the authors examine decayed, missing and filled teeth separately.

When assessing missing teeth, have the authors inquired about history of trauma, teeth removed for orthodontic purposes, etc.? If not, they should elaborate on this as a limitation of including missing teeth in the caries experience.

Gender should not be referred to as an SEP indicator. (line 10, page 6)

Table 1 should be reported on in the results section as 'characteristics of study participants'.

Table 1 indicates urban for some of the school locations, yet, the city Gangneung has been described as a rural city. Please clarify whether all schools were within the city of interest.

Is there supporting literature in the Korean context on the socioeconomic differences between families opting for vocational versus general schools that would support the authors' choice of 'type of schooling' being an SEP indicator?

It is unclear from the wording whether parents' education refers to maternal or paternal education. Please elaborate on this in the methods section, specifying how this was measured.

How was perceived economic status measured? Please explain.
Operationalization of oral health behaviours: the frequency of snacking and soda may be better dichotomized as "yes or no". What did the authors mean by "yes or no" for annual dental visits? Visiting the dentist at least once a year? Please clarify.

Usually, due to the high number of zeros in DMFT or dental caries generally, negative binomial regressions or Zero-inflated Poisson are used. Also, why wasn't a survival analysis conducted to determine whether participants remained caries-free over the two-year period? The authors need to clarify why they opted for their statistical methods, and further explain how these were conducted.

Results:
- The symbol † in the legend for table 2 has no corresponding meaning within the table.
- Table 3. It is unclear whether these results are reported from baseline or follow-up data.
- The headings for table 4 are not clear. I would suggest changing No□No as remaining caries-free; No□Yes as developing dental caries; etc. or providing the explanation in the legend. Also, it is not common to put statistical significance as a separate column. I would suggest putting the asterisk for statistical significance in the same columns as N (%), where applicable.

Discussion:
- Line 22 (pg 11): It is quite unclear what the authors intend to state. The authors state that "Female students were found to have almost three times the chance to experience DMF teeth than male students, while there was no significant difference in untreated dental caries." This statement implies that the high DMFT in girls is due to the M and F components. However the authors continue to support their findings by stating "This adheres to findings in the 2012 Korean National Oral Health Survey, which showed higher prevalence of decayed teeth among girls by 10.6%". On the contrary, this might imply that females get more timely treatment than male students. This should be sufficiently elaborated on in the discussion.

Quality of written English:
- The manuscript will need extensive edits and revisions before it is suitable for publication.
Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.
No

Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.
Yes

Are the conclusions drawn adequately supported by the data shown?
If not, please explain in your comments to the authors.
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