Reviewer's report

Title: Multilevel analysis of caries in underprivileged adolescents of Brazilian southeast

Version: 2
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Reviewer: Fernanda Ferreira

Reviewer's report:

I appreciate the opportunity to review this manuscript. The paper deals with a still little explored issue: the extent to which dental caries in adolescence is affected by individual-level and contextual-level predictors. However, there are some aspects that the authors must clarify before a decision on publication could be reached.

1. Major Compulsory Revisions

1.1. Data analysis:
- The authors stated that the dependent variables were "number of carious teeth" and "DMFT index". However, throughout the discussion and even in the conclusion, they use expressions such as "presence of caries" (lines 391-392; lines 490-491; line 536), "cases of caries" (line 398), "prevalence of dental caries" (line 487) to refer to these variables. This is misleading, since caries was not a binary outcome in the study. Please check this.

- What procedure was followed to include and/or exclude explanatory variables in the models? Was it based on the bivariate analysis? If so, why were these statistics not presented? Was multicollinearity problems assessed?

- I would like to hear the authors’ reasons for including the variable "need for dental prosthesis" in the models to explain dental caries. Even with the cross-sectional design, which does not allow inferences regarding causality between variables, when building a model, covariates are selected according to a conceptual idea of possible predictors of the outcome. The study aim stated by the authors (to identify individual and contextual risk indicators for caries in underprivileged adolescents, lines 166-168) confirms this intention. However, "need for dental prosthesis" is a measure of missing teeth, which in the adolescence is usually a consequence of more severe stages of dental caries. Moreover, missing teeth is a component of the DMFT index used to measure dental caries in the study. Therefore, the relationship between these 2 variables appears to be obvious, but in the inverse direction. The same reasoning applies to the variable "toothache", since pain is a consequence of untreated dental caries. Another concern about the variable "need for dental prosthesis" is the fact that the category used as reference in the multiple analysis (need for multiple-element dental prosthesis) had a very low prevalence rate in the sample (n=4, 0.34%; Table 1). How did this impact the accuracy of the estimates in the models? The same applies to the variable "prison inmate in family" (see Table 1).
1.2. Was the length of time the adolescents have lived in the suburbs considered? An adolescent who has resided in the suburb for only few months would not have the same exposure or opportunity to be affected by the social environment as someone who lived in the suburb for several years. This issue is particularly relevant because the study includes high proportions of very low income subjects, and the residential mobility can be quite high among that population. This aspect must be discussed.

1.3. The conclusion must be rewritten to be better aligned with the findings, which suggest that variations in the DMFT and the number of decayed teeth in the sample are mainly related to individual variables. The results would benefit from the inclusion of the significance values for the estimated variance in the tables. In fact, the estimated value of the between-suburbs variance (when compared with their SE) appears to be not- significant even in the null models, suggesting that these suburb clusters did not differ with regard to caries severity. The intraclass correlation coefficients were very small (<0.02), which also indicates that a negligible source of variance was found among contexts. The Model 3 did not show any significant improvement when compared to the Model 2. Furthermore, the measures of fit of the final models indicated that it was still a considerable caries variation that could not be explained by the individual and contextual variables assessed, which should be better addressed in the discussion section. The authors have suggested that complementing data with other contextual variables could have reduced the unexplained community-level variance (lines 529-531). However, the community-level variance was almost depleted in Models 3. I believe that what could actually enhance the explanatory power of the models would be the inclusion of other individual variables such as behavioral predictors (dietary practices and oral hygiene habits) as well as bacterial and salivary factors.

2. Minor Essential Revisions

2.1. The title is superficial, includes reference to the method of analysis used (which is not necessary) and does not clearly convey the aim of the study. The running title does not mention the dependent variable. Please consider changing them. Suggestion: "Individual and contextual factors related to dental caries in underprivileged Brazilian adolescents"

2.2. There is a typographical error in the sample size in the abstract, line 70 (1,179 instead of 11,779).

2.3. The authors should refrain from using words such as "risk indicators" throughout the text, since the study has a cross-sectional design, which does not allow this kind of inference.

2.4. The text in general is unnecessarily long, especially the abstract, introduction and discussion sections. I suggest that these parts be shortened, if possible. Much space was spent on describing and discussing issues that are not directly addressed in the study, as in the second paragraph on page 18, while relevant
information is left out. Beyond that, the authors fail to offer a more in-depth discussion on the results of the study. They also issue some broad and unreferenced statements.

2.5. In general the reference list is quite comprehensive, but it contains some references that are not relevant to the manuscript and misses closely related studies like:


2.6. The methods section could be restructured to become clearer. Some suggestions in this regard:

- Only variables that are sufficiently important to accomplish the study purpose should be presented in the text. Moreover, these variables must be well described in the methods section (including the categorization used for the analysis) and addressed in the results and discussion sections, even if they were not associated with the outcomes. For instance, the variables "periodontal disease", "fluorosis", "fathers' and mothers' education level", "type of housing", "family grand program", "has lived in a city other than Piracicaba", "number of siblings", "failure to pass end of year school tests", "adolescent works", "father and mother work", "self-satisfaction with the appearance of teeth", "OIDP", "visit to the dentist", "type of dental service generally used and reason", "WHOQOL-BREF", "total number of residents per suburb", "literacy rate", "% of home ownership", "% garbage collected" and "% within each income stratum" were all listed in Figure 1 as having been assessed in the study; some are described in detail in methods (i.e. lines 260-278), but none is reported in the results or addressed in the discussion. On the other hand, important variables to the results such as "self-perceived oral health" are only briefly mentioned. Was the feasibility of the questionnaire previously tested? Was it administered in interview format or self-administered? Please briefly describe the "social exclusion index". What exactly was considered as "caries teeth" in the study? The component "D" of the DMFT index? Was the variable "prison inmate in family" determined through the adolescents' reports (lines 349) or the SIAB (lines 283-285)? What was really measured – "household crowding" or "number of persons in the family"?

- The sections "Study location", "Study universe", "Sample", "Inclusion and exclusion criteria" can be grouped. The type of sampling employed is not clear. The randomization method needs to be described. How was it defined how many and which adolescents would be contacted from schools and which would be from the PHC-HF units? Did this double selection procedure represent selection bias? Were both examinations (in the schools and the PHC-HF units) conducted in a clinical setting (on a dental chair, under conventional dental illumination and with the assistance of a 3-in-1 syringe)?
- I suggest the authors revise the criteria for inclusion, exclusion and reporting losses. I believe there is some confusion with regard to these aspects.

- Was a pilot study conducted before the data collection?

2.7. Please consider including the location and date of the data collection in the title of the tables and a description of the contextual variables in the results. This would be helpful to clarify the level of heterogeneity of the suburbs characteristics.

2.8. In the discussion section, I could not understand what the authors mean in the closing argument in the first paragraph on page 20 (lines 472-473). The authors failed to explain the association between DMFT and age, since the cumulative effect of the disease was disregarded.

2.9. The text needs proper English language editing.

**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Needs some language corrections before being published

**Statistical review:** Yes, and I have assessed the statistics in my report.

**Declaration of competing interests:**

I declare that I have no competing interests.