Reviewer's report

Title: Attributable fractions in large scale surveys considering multiple risk factors

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Reviewer: Nino Kuenzli

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The paper gives a nice introduction into the use and limitation of attributable fractions (AF). It applies a previously published approach to multivariate AF’s and provides the programs for three often used statistical packages. I very much enjoyed reading this paper. The AF’s are indeed an important measure of public health risk, and despite a revival of its use in the health impact assessment field, its limitations as outlined in this paper are not always acknowledged.

I have a few comments or suggestions that may strengthen the paper and raise the interest of the readers:

1. The main table (Table 3) could be expanded by two aspects. First, I suggest providing a second column for the Sequential AF, using however the opposite “entry order” of the variables. This would give an example of two (out of 5040) possible results. Second – and related to this point - the main result (Average AF) could be complemented by its confidence intervals. A more in-depth discussion of the uncertainty (range) in the ‘average AF’ would naturally follow from this presentation. Do the authors know what the factors are that may determine the heterogeneity in these 5040 AF’s?

2. A not addressed but rather relevant issue (discussion) is the question of the appropriateness (not only completeness!) of the chosen model, and the chosen example gives in fact room for examples to mention this aspect. E.g., one may debate whether the multivariate model chosen in the example to be “biologically appropriate” (or ‘the best model’) or rather a model that includes a mixture of risk factors and factors on the causal pathway between these risk factors and CVD. The paper could then show an alternative model to give an idea of the influence these model choices could have on the AF (or average AF and CI). E.g., one could use “hypertension” to argue whether this is an independent risk factor or on the causal pathway of smoking-related pathologies. If one favors the latter idea, hypertension needs to be dropped from the model, and AF’s would likely change. This would result in a ‘quantified caveat’ about the impact of model specifications used for AF. The need to develop the ‘most appropriate model’ to investigate the research question, thus, remains the top priority.

3. Please discuss the limitations related to using dichotomized variables. The best multivariate models are certainly not those and I wonder whether an application of ‘average AF’ to the real world of continuous variables would be straightforward or not.
4. A major limitation of the average AF is, as mentioned by the authors, the need to have access to original data. Do the authors see any solution to this problem or could they discuss or speculate about the way forward in all those cases where original data are not available at all? This is most often the case in health impact / risk assessments.

Level of interest: An article of importance in its field

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

Statistical review: Yes, but I do not feel adequately qualified to assess the statistics.

Declaration of competing interests:

I declare that I have no competing interests