Reviewer's report

**Title:** Limited Variation in Biomarker-Based Health Indicators by Socioeconomic Status in a sub-Saharan African Low-Income Population

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**Reviewer:** Pascal Bovet

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Major revisions

1) The paper is essentially about the cross sectional relation between three types of markers (lipids –atherosclerosis-, creatinine-renal disease- and CRP -inflammation) and SES in Malawi, which is a straightforward question. However, the text is very long, convoluted, and includes a lot of discussion on issues not directly related to the topic (e.g. long explanation on what is a biological marker, what is the role of lipids, creatinine or CRP, etc: these issues need no explanation as the significance of these markers is well established. The paper could be at least two times shorter (two times less words). Typically, any journals would require that such a paper include less than 3000 words in total. For example, the introduction could be cut by more than half and should include just 2-3 small paragraphs to emphasize what is known on the relation on the 3 types of markers (lipids, CRP and creatinine) and SES in Africa and what are the gaps of knowledge.

2) The number of references is also too large and many references are not directly related to the aim of the paper (relation of the three types of markers and SES in Malawi).

3) In general, it would be easier to distinguish in the paper three types of markers; blood lipids (which relates to atherosclerosis), non specific CRP (which relates to inflammation), and creatinine (which relates to any type of functional or organic renal disease linked to any other infectious or other diseases). Hence the meaning of these three types of markers is largely different and it is of no use to attempt to show a common pattern for these 3 types of markers (as they underlie vastly different diseases). In addition creatinine is a marker of disease (renal disease) while CRP and in particularly lipids are markers of a risk (not disease). In addition, it is known that creatinine or CRP are not strongly linked (as they represent diseases not linked strongly to lifestyles) with SES while lipids are strongly related to SES (as they are strongly related to diet and lifestyle factors).

4) The title (and abstract) could be made clearer to show this emphasis on 3 issues, e.g. "Association of blood lipids, creatinine and CRP with SES in Malawi". The word “biomarker-based health indicators” is uselessly convoluted and not informative (as there are thousands of possible markers).

5) The emphasis should be on Malawi and Africa. Contrary to what is stated, there are quite a lot of data and studies on blood lipids, creatinine and CRP in
Africa (e.g. Cameroun, Ghana, Zambia, South Africa, Tanzania, Seychelles, Mauritius, etc). The authors could look in the Infobase of WHO to look for such studies and on Medline. A paper from the Global Burden of Disease project (Ezzati et al) was published in Lancet in 2011 and includes data from many countries in Africa. There is no reason to systematically compare data in Malawi with data in the USA only, and provide so many references on the US, since the emphasis is on markers in Malawi and, perhaps, other low income countries.

6) The authors challenge cutoff values of the markers in Malawi as compared to high income countries. First, this issue is not central to the paper (which is the relation of markers with SES). Second, cross sectional data in Malawi are not useful to address this issue as challenging cut offs should be based on cohort studies with clinical outpoints. Third, many papers have shown that cutoff values may not be so different between countries (e.g. lipids in INTERHEART study, including papers on data in Africa).

7) While most parts of the paper could be much shorter, the part on how markers were measured (LabAnywhere) should be provided in more detail (and with adequate references) as it remains to be shows that a test based on a single drop of blood from the finger can be valid. This is largely not the case even for tests as simple as blood glucose or blood cholesterol. Information on within day and between day variation should be given (CV) and more details should be stated as to possible biases usually associated with any finger prick measurement (e.g. when finger is pressed to allow blood to flow, etc). This is central as all outcomes in the paper are based on this test.

8) Figure 1 is too big and could be replaced by one single and rather short table showing mean values (or median values) of the markers by age group and sex (with a test of trend).

9) Table 3 and Table 4 are clearly the focus of the paper. The two tables could be combined in one single table and results could be shown in a much more parsimonious and concise way. Multivariate linear regression (based on continuous variables for markers) would be more powerful than logistic regression (outcome dichotomized percentile 75+). Most importantly, since SES is the focus, it would be more convincing to show fewer models (say one model using a score made of wealth indicators expressed in 3 categories, a second model with a score made of education variables expressed in 3 categories, and a third model using both the wealth score and the education score.

Level of interest: An article of importance in its field

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

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:
'I declare that I have no competing interests'