Reviewer's report

Title: Persistent socioeconomic inequalities in cardiovascular risk factors in England over 1994-2008: a time-trend analysis of repeated cross-sectional data

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Reviewer: Bruna Galobardes

Reviewer's report:

The authors have covered a significant number of the questions raised. I do have, however, remaining concerns about two important aspects.

Removing the health domain from IMD:

The authors argue there is no need to remove the income domain from the IMD citing an article (ref number 50) that found little difference in health outcomes using census data (as stated in title). The obvious answer to this is that this may not apply to other outcomes and should, at least, be investigated.

For my own knowledge I searched the article and I was reassured just by reading the abstract (which made me wonder if the authors have only read the title): “Removing the health domain had little, practical, effect on measured socioeconomic inequalities in census measures of health. These findings may not hold for other measures of health, and in the context of socioeconomic inequalities in health, removing the health domain from IMD 2004 probably represents best practice.”

I would encourage the authors to do what is best practice.

The second argument used to defend no need to remove the health domain has no bearing in this issue and should be deleted: “Furthermore, such “mathematical coupling” can also occur with individual-based markers such as occupation or income being a consequence as well as cause in any association with health [33].” What the authors are referring to is reverse causality, a separate and very different issue. Reverse causality has been investigated in cardiovascular disease and it has been found to explain little of the socioeconomic gradient.

Merits of using area-based rather than individual measures of SEP:

Whilst stating correct facts such as that contextual measures of SEP show associations with health outcomes there is a conceptual error in considering contextual level “better” than individual. It all depends on the level of inquiry and the authors are interested in individual, not contextual, level of socioeconomic position (SEP). The Health Survey of England (HSE) has individual level indicators of SEP that are not being used. There is a principle here, and I think it is important, about using the best data available. There is no basis or need for
using area-level deprivation as a surrogate for individual-level SEP when individual indicators are available.

If the authors were interested in area level inequalities, then they have the excellent opportunity to use appropriate multilevel models to investigate the effect that area deprivation has beyond the individual SEP. That would be very interesting, but it is a different question and would require different and appropriate statistical methodology.

**Level of interest:** An article of importance in its field

**Quality of written English:** Acceptable

**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'