Reviewer’s report

Title: The association of education with body mass index and waist circumference in the EPIC-PANACEA study

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Reviewer: Benoit Salanave

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The association between overweight/obesity and SES is an important issue. Overall the paper confirms the results of previous studies. However, I think there are some aspects that should be reviewed or clarified.

- Major Compulsory Revisions

1) It is not possible to write that anthropometric measurements were “highly standardized” when:
   - information on weight and height were self-reported in 3 countries and measured in 7 others,
   - body measures have been predicted using linear regression in the Oxford centre (but not in the other centres in which self-reported data have been collected),
   - a “method for correcting for different measurement protocol among centers” has been used “to reduce heterogeneity due to protocol differences in clothing worn during measurement”,
   - WC were measured “either at the narrowest torso circumference or midway between the lower ribs and the iliac crest” (the narrowest torso circumference is usually not recommended due to a lack of accuracy),
   - information “were assessed using questionnaires and/or interviews” according to each country.

I agree with the authors that underreporting has probably caused a weaker association between BMI and SES, but the other discrepancies between protocols need to be analysed and discussed in a specific paragraph of the discussion.

2) Differences between country cohorts need to be clarified and discussed. This major point is tackled in one sentence (the last one) at the end of the discussion. The fact that “comparisons between cohorts should be interpreted with caution” because “the cohorts are in the majority not representative of a country” should be discussed in a specific paragraph, earlier in the discussion, and examined in more details. Which are the consequences to pool such different populations together (teachers, blood donors, participants in breast cancer programs, vegetarians) for both, the comparison between cohorts and, the assessment of the association between BMI/WC and education? More details on the recruitment
in the different countries are needed: date of recruitment varies from 1992 to 2000, age ranges are not described (were they different between countries? “in majority 35 to 70 years of age” is not informative). Further more, I think it is important to give details on inclusion procedures: individuals were not randomly selected but were volunteers. It is also important to explain that, although EPIC is a prospective cohort study, analyses for this paper have been realized on cross-sectional data collected at recruitment.

3) An other important point is not discussed, the fact that more than a quarter of the study population (27%) has missing data for WC. What is the effect on the association between WC and SES? This point must be mentioned at least in the discussion. In addition, it should be necessary to compare excluded subjects and subjects for which WC data were available.

4) Another point concerning missing data needs to be clarified. In “Materials and Methods / Covariates”, the authors explain that missing data has been defined as a specific category for smoking status, physical activity and marital status. Then, in table 2, these three variables are differently presented: smoking status has a footnote explaining that percentages don’t ”add up 100% due to missing information”, physical activity has percentages that add up 100% (missing data would have been excluded in fact, contrary to what is written in the Methods?) and missing data for marital status are notified in a specific line?

5) In “Materials and Methods / Anthropometric measurements”, the definition of overweight according to the WHO is not correct. As mentioned in http://apps.who.int/bmi/index.jsp?introPage=intro_3.html, overweight for WHO is BMI#25 without upper limit.

6) In the "discussion, 5th paragraph", the authors discuss about the choice of education as an indicator of SES but they don’t argue that education is considered to influence obesity-related health behaviour (Ball K, Soc Sci Med 2005,60:1987-2010). Compared to occupation and income, education is assumed to be stable throughout life and to reflect childhood conditions. In the GLOBE longitudinal study (Giskes K, Obesity 2008,16:1377-1381) both childhood and adulthood socioeconomic deprivation increase the risk of overweight in adult women, whereas only adult SES influences overweight in adult men. Since the publication of the review of Sobal and Stunkard in 1989 (Sobal J, Psychol Bull 1989,105:260-75), several cross-sectional and longitudinal studies have shown a more consistent relationship between SES and overweight in women than in men (Wardle J, Am J Public Health 2002,92:1299-1304 / Wardle J, J Epidemiol Community Health 2001,55:185-190 / Novak M, Int J Obes 2006,30:191-200). Although occupation, income and education are not completely independent, it would be of interest to discuss more in depth the influence of these three SES dimensions on the relation between SES and overweight or obesity (Turrell G, Public Health Nutr 2003,6:191-200).

- Minor Essential Revisions
7) Introduction / last sentence: delete “highly standardized”.

8) Materials and Methods / Population and study design: “(in majority 35 to 70 years of age)” give detailed age-range by country.

9) Materials and Methods / Population and study design / 2nd paragraph: “we excluded subjects with missing information on dietary and non-dietary variables” ie all variables? But smoking status, physical activity and marital status have a specific missing category and are not concerned? Moreover, it should be of interest to know if the subjects with missing data on alcohol consumption, for example, have been excluded or not? This point needs clarifications.

10) Materials and Methods / Anthropometric measurements / 1st paragraph: “For part of the Oxford (UK) cohort [add: for which measured data were not available], linear regression models were used …”.

11) Materials and Methods / Anthropometric measurements / 1st paragraph: “The measured anthropometric data were adjusted to reduce heterogeneity …” Although reference is mentioned, a few words are needed to explain how data were adjusted.

12) Materials and Methods / Anthropometric measurements / 2nd paragraph: delete “according to the World Health Organization guidelines”.

13) Materials and Methods / Covariates: it is important to mention that all variables were recorded at recruitment at baseline (not only age).

14) Materials and Methods / Statistical methods / 1st paragraph: UK is mentioned neither in the list of countries with one centre nor in the list of countries with more than one centre?

15) Results / 2nd paragraph: the comments on table 2 have to be revised. The authors write that “subjects with a low educational level were … shortest” but height is not mentioned in the table, “they were more frequently current smokers” but it is not the case for women.

16) Results / 4th paragraph: Figures have been inverted between men and women.

17) Results / last paragraph: idem for Figures numbers. I have not understood the last sentence: What “also” refers to? What is concerned by the “respectively”? Is non-significant difference compared to low education or is it between secondary and professional schools?

18) Discussion / 2nd paragraph: replace “(see Table 1)” by Table 2

19) Discussion / 5th paragraph: delete “highly standardized measured anthropometric data for most participants”.

- Discretionary Revisions
20) I’m surprised by the fact that no French women have attained the “vocational secondary education” category. Does it mean that definitions of education levels could be so different between countries? Or is there a particular reason?

21) I’m also surprised by the important rate of missing data for the marital status. This rate varied strongly by education level. Did it vary by country, too? It is probably one of the main reasons to explain that “adjusting for marital status did not change the results”.

**Level of interest:** An article of limited interest

**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