Reviewer's report

Title: Chronic disease burden associated with overweight and obesity in Ireland: the effects of a small BMI reduction at population level

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Reviewer: Nadia Danon-Hersch

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SUMMARY OF THE ARTICLE
This cross-sectional study estimates the prevalence of overweight and obesity in Ireland, using self-reported height and weight, as well as the prevalence of self-reported chronic disease in the previous 12 months. The association between BMI and several chronic diseases is estimated with binary regression. The Population Attributable Fractions (PAFs) of selected chronic diseases attributable to overweight and obesity are calculated, as well as the impact of one unit reduction in BMI on the overall burden of chronic diseases. The prevalence of overweight and obesity is 43.0% and 16.1% in men, 29.2% and 13.4% in women. The most prevalent chronic conditions were lower back pain (16%), hypertension (16%), and raised cholesterol (16%). The strongest associations were found in obese women for diabetes (RR 3.9, 95% CI 2.5-6.3), and hypertension (RR 2.9, 95% CI 2.3-3.6); in obese men for hypertension (RR 2.1, 95% CI 1.6-2.7), and osteoarthritis (RR 2.0, 95% CI 1.2-3.2). PAFs calculations indicate that 42% cases of diabetes are attributable to increased BMI (BMI ≥25kg/m²) in women, and 30% of cases of hypertension are attributable to increased BMI in men. The authors estimate that, overall, a population-wide one unit decrease in BMI results in 27 fewer cases of chronic disease per 1,000 men (5%), respectively 29 fewer cases per 1,000 women (4%). The authors conclude that achieving a modest reduction in average BMI in the population can make a significant impact on the burden of chronic disease, highlighting the important potential of a population-based strategy.

Major compulsory revisions:
1. Abstract: the main exposure, i.e. the prevalence of overweight and obesity in men and women should be given in the results.

2. Methods: The participation rate or the response rate to the SLAN 2007 survey should be given (response rate 62%, according to reference 13). Could there have been a selection bias? The literature suggests that healthy individuals with healthy lifestyles are more likely to participate in health surveys than persons with less healthy lifestyles. Although this response rate is acceptable in comparison with other population-based studies, the authors should also mention in the Discussion that overweight and obesity prevalence might have been underestimated because of a selection bias.

3. Methods, statistical analyses: The difference between logistic regression and
binary regression is not clear. The regression models used in Tables 3 and 4 should be precisely described (if necessary, the Stata command could be given). It is true that it is preferable to calculate RRs (rather than ORs) for common outcomes (here: the prevalence of chronic diseases).

4. Results: Table 2: An additional column with the total prevalence of each of the 10 chronic diseases in each sex would be helpful.

5. Results: text describing Table 3: The authors should indicate whether there was a significant sex interaction in the association between BMI category and diabetes (effect modification by sex), rather than reporting a “significant difference in the strength of association between diabetes and increasing BMI for both genders”.

6. Results: Table 4: While the formula used for Table 3 (with a binary exposure) is shown in the methods (Levin’s formula), I don’t understand how the predicted prevalence estimates of chronic diseases were obtained in Table 4 (Scenarios 1 and 2), using BMI as a continuous variable. The authors could also indicate the predicted prevalence of overweight and obesity with the population shift to the left of 1 kg/m2 of BMI.

Minor essential revisions:

7. Abstract: the aim of the article is not precisely stated.

8. Abstract: the age range of the population should be given.

9. Background: “… and an estimated 35.8 million (2.3%) global disability-adjusted life years (DALYs)”: it is not clear if it is also each year (like the 2.8 million adult deaths each year). The denominator for the percentage 2.3% is not clear.

10. Methods: the authors should specify if the sample had been randomly selected.

11. Methods: The link to reference 13 should be given.

12. Methods: The specific question asked to the study participants about occurrence of chronic diseases in the past 12 months should be given. It is not clear whether the diseases have been diagnosed by a Doctor (or a health worker), or by the participants themselves.

13. Results: Table 1: 2 additional columns with Chi-square P-values could be given for the associations between BMI categories and each adjustment variable for men and women. In addition, the statistical significance (Chi-square P-values) is given in the text, but the associations sometimes have opposite directions in men and women (for example, for employment status).

14. Table 2: The authors should indicate whether they display Chi-square P-values or test for trend P-values. The total number of men and women should be indicated on the Table.

15. Table 3: The total number of men and women should be indicated on the Table.

16. Discussion: Could there have been systematic sex differences in the extent
to which medical diagnoses are under-reported? According to Table 3 and the Figure, the burden of BMI ≥25 kg/m² is higher in women than in men. A small literature review might be useful. In the same way, could there have been sex differences in the extent to which BMI has been under-reported?

17. Discussion: a reference should be given for explaining why risk estimates are likely to be reduced in cross-sectional studies compared to longitudinal studies.

Discretionary revisions:
18. Results, Table 1: the prevalence of men and women with at least one chronic disease (of the list selected by the authors) could be given.

Level of interest: An article of importance in its field

Quality of written English: Acceptable

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.