Author's response to reviews

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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Version: 2 Date: 14 December 2013

Author's response to reviews: see over
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Version: 2  Date: 14th December 2013

Author's response to reviews: see over
Reviewer's report

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

Version: 1 Date: 24 October 2013

Reviewer: Jan-Magnus Kvamme

Reviewer's report:

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

This is a well written paper addressing the cumulative burden of chronic diseases associated with overweight and obesity in Ireland. The research questions are clearly defined and the methods are sufficient described.

Major Compulsory Revisions:

(1) With regard to further details of the SLAN 2007 survey, the reader is guided to the reference 13, see page 5. However, I would like you to the authors to include some basic information about the attendance rate in this survey. If this was low, this should be commented on in the Discussion.

Response rate added (page 5). The following re potential selection bias has been added to the Discussion (page 14): “Although the SLÁN 2007 survey had a reasonable response rate (62%), there is the potential for selection bias, for example, less healthy individuals may be more likely to refuse to participate, which may have resulted in an underestimate of overweight and obesity prevalence estimates.”

(2) The chronic diseases included in the analysis cover both diseases for example lower back pain, osteoarthritis and risk factors for disease as hypertension and raised cholesterol. These distinctions should be included in the text (Page 6, second paragraph).

Agree; this has been changed.

(3) Table 2 contains quite much information and could be commented on in the text with some more details, i.e. lower back pain, hypertension and raised cholesterol were the most prevalent conditions increasing with higher BMI.

More details have been added for this section of the results.

(4) The limitations of the study are discussed on page 14. All the conditions were self-reported and it is possible that blood pressure and cholesterol had been measured more frequently in the overweight and obese individuals compared to the normal weight individuals. This potential bias could be included in the discussion.

I had included that the known association between excess weight and chronic conditions increases the likelihood of diagnosis in heavier people and may represent an additional source of bias. The following sentence has now also been added to page 15 “For example, it is likely that diagnosis of high blood pressure and raised cholesterol is greater in overweight and obese individuals due to more frequent measurements in these individuals compared to those that are of normal weight.”
Minor Essential Revisions:

(1) In figure 1, the vertical lines should be explained; I would think they represent 95% CI? Correct, this has now been added to the figure description.

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
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, hypertension, and raised cholesterol. 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 26 fewer cases of chronic disease per 1,000 men (4%), respectively 28 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.
   Agree; this has been added to the abstract.

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.
   Agree; Comments re potential selection bias added to the Discussion (page 14).
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).

I have added that we used three log-linear binary regression models to estimate the relative risks and 95% confidence intervals. The previous mention of logistic regression has been removed from the paper to avoid confusion. Both logistic regression and the log-linear binomial model can be used for the analysis of a dichotomous outcome. Both models model the probability of the outcome (e.g., probability of disease given the exposure and confounders), and both assume that the error terms have a binomial distribution. The difference between the logistic model and the log-binomial model is the link between the independent variables and the probability of the outcome: In logistic regression, the log(odds) of the outcome are modelled as a linear function of covariates whereas for log-linear binary regression we model the log(probability) as a linear function of covariates. In general, the log-linear binomial model produces an unbiased estimate of the adjusted relative risk.

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

The total prevalence has been added for men and women.

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”.

This sentence was removed as it was phrased incorrectly. It was re-phrased to say that the increase seen in diabetes associated with increasing BMI was not statistically significant in men but the association in women was highly statistically significant.

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.

Text has been added to the Methods section explaining how the PAFs were calculated. The PAF formula was included initially to inform the reader about the process but this was removed to avoid confusion as the formula was not used to calculate PAFs in this paper.

Text has been added (page 7/8) describing how the one unit reduction in BMI was estimated. Following the reviewer’s comments, we revised our method as described in the paper (page 8). As a result, some of the results in Table 4 have been revised so that they now agree with Table 2. The one unit reduction in BMI (Table 4) is based on the prevalence and relative risks of the chronic conditions. Taking high blood pressure as an example, the prevalence in men was estimated at 16.3%. Based on a log-linear regression with continuous BMI, we estimated the relative risk to be 1.07, resulting in an estimated prevalence of 15.2% (16.3/1.07 = 15.2) after a one unit drop in BMI. A note has been added to Table 4 stating that the prevalence of chronic disease based on a one unit (1 kg/m2) reduction in BMI was estimated by dividing the prevalence estimates (Scenario 1) by the relative risks obtained from a log-linear regression using BMI as a continuous variable.

We have also indicated the predicted prevalence of overweight and obesity associated with a one unit reduction in BMI (page 12). Taking the current prevalence of overweight and obesity, we reduced the BMI by 1.0 and again estimated the prevalence of overweight and obesity.
Minor essential revisions:

7. Abstract: the aim of the article is not precisely stated.
The aims have been added to the “Background” of the Abstract.

8. Abstract: the age range of the population should be given.
The age range of the study population has been added to the Abstract.

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.
The year that this relates to (2004) has been added on page 4. For reference, the denominator (total global DALYs) is 1,523,259,000. The percentage attributed to overweight and obesity is 2.3% or 35,796,000.

10. Methods: the authors should specify if the sample had been randomly selected.
It was a randomly selected sample with a response rate of 62%. This information has been added to page 5.

11. Methods: The link to reference 13 should be given.
This has been added to reference 13.

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.
The question asked to the study participants has been added (page 6).

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).
Chi-square P-values added as notes underneath the table rather than adding additional columns to the table.
Additional text inserted on page 8/9 further detailing the associations, 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.
Note added to table specifying that the p-values are chi-squared p-values.
The number of men and women were added to the table and a note was added to explain that the numbers for each chronic disease differ due to different numbers of respondents.

15. Table 3: The total number of men and women should be indicated on the Table.
Similar to Table 2, number of men and women were added to the table along with a note.

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 ≥25kg/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?
Good point. Potential sex differences in the reporting of both height and weight and chronic conditions have been mentioned in the limitations (page 15).
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. Reference added for this.

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. The numbers and percentage of people with no chronic disease, one chronic disease and two or more chronic diseases has been added to Table 1 and some text has been added to the Results section (page 8).

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.