**Author's response to reviews**

**Title:** A procedure to correct proxy-reported weight in the National Health Interview Survey, 1976-2002

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**Version:** 2 **Date:** 8 December 2008

**Author's response to reviews:** see over

**Reviewer's report**

**Title:** A new procedure to correct proxy-reported weight in the National Health Interview Survey, 1976-2002

**Version:** 1 **Date:** 8 September 2008

**Reviewer number:** 1

**Reviewer's report:**
The purpose of this paper is to provide a way of correcting proxy-reported data on height and weight and self-reported data on height and weight from the National Health Interview Survey of the United States. The major finding of this paper is that the sharp increase in BMI from 1996 to 1997 is due to a change in methodology of the NHIS that no longer allowed the use of proxy-reported height and weight as answers in the survey questionnaire. This change led to a greater difference in the data from 1996 to 1997 than actual exists as proxy-reporting systematically underestimates weight compared to self-reporting. The under-reporting of weight in proxy respondents differs by a number of factors including race, sex, education and age of proxy-respondents. The question posed by the authors is well-defined but not new.

Comments

The methods are appropriated and well described and the paper is well written. Although interesting from a statistical point of view, this paper is of limited use to a non-USA readership. The use of self-reported data (regardless of the issue of proxy-reporting) to calculate BMI is difficult to justify because many studies and good data sets have clearly described the limitations of self-report as opposed to use of measured height and weight data from survey participants.

*Certainly, we agree that researchers should use measured height and weight to calculate BMI whenever possible. However, a number of studies that are important resources for epidemiologic research use self-reports of height and weight. Aside from the NHIS, some of these studies include the Behavioral Risk Factor Surveillance System (BRFSS), the Youth Risk Behavior Surveillance System (YRBSS), the Wisconsin Longitudinal Study (WLS), the Americans' Changing Lives (ACL) study. In addition, on p. 12 of our revised draft, we identify a handful of epidemiologic investigations (both U.S. and international) that have used proxy-reports of height and weight (i.e., the National Long-Term Care Survey, the Ontario Familial Colon Cancer Registry, and the Continuing Surveys of Food Intakes by Individuals). Given the continuing widespread use of such data, we believe that it is important for researchers to think carefully about potential flaws and biases in estimates of BMI that are based on proxy- and/or self-reported height and weight.*

The main reporting biases that occur in high income Western countries are as follows:

• People under report weight;
• People over report height;
• The discrepancy between self-report increases with the age of the responder.

There are male/female differences that do occur within this pattern. The pattern of reporting bias does differ (often dramatically) by sub region, although the age effect is generally consistent across the world. Given these constraints, most developed countries with routine national health surveys now use only measured data on height and weight to calculate BMI. The real question is then is how to correct the known reporting biases in the self-reported NHIS to approximate the true population BMI by age and sex and to accurately forecast the need for increased resources to meet a potential rising epidemic of obesity in the United States.

*We agree with these comments. However, applying a BMI correction to NHIS data without first addressing the biases in the proxy- and partial self-reports of weight would yield unsatisfactory results. Our aim with this investigation is to make researchers aware of both issues, and to give them the tools necessary to reduce the biases in proxy- and partial self-reporting.*

*That said, we have extended the discussion to address more general issues of measurement error that are due to reporting bias. We compare our estimates to NHANES examination data (see p. 14 and Figure 4) and explicitly acknowledge the need for further adjustments to maximize the validity of self-report data in the NHIS. We believe that these additions help place our analyses into a context that makes the paper more relevant to a larger audience.*

The paper as written is more appropriate as a technical note to users of the NHIS data set than for publication in an international journal. That being the case, even a technical note would benefit from the following minor essential revisions:

• Better definition of proxy-reporting in the introduction of the paper so that the reader can identify with the proposed problem to be addressed; and

*We have attempted to improve our definition of proxy-reporting in the introduction by changing the text to read as follows: "In 1997, the NHIS discontinued the practice of allowing proxy-reporting for adults [1,2], a practice where one adult could provide survey responses for other adults in the same household." (p. 3)*

• The paper would benefit from some explanation as to why we see differences in the effect of proxy reporting by race, sex and education status.

*We have added a paragraph to the discussion section (pp. 13-14) that addresses these demographic differences and what they imply for the validity of proxy-report data, especially pertaining to estimates of weight.*

**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Acceptable

**Statistical review:** Yes, and I have assessed the statistics in my report.

**Reviewer's report**

**Title:** A new procedure to correct proxy-reported weight in the National Health Interview Survey, 1976-2002

**Version:** 1 **Date:** 8 October 2008

**Reviewer number:** 2

**Reviewer's report:**

Overall comments:

1. The objective of the paper is well defined and clear, and the overall structure is good.

2. Although the direct application of the results of this paper is limited (rather few surveys need adjustment for proxy reported weight), the paper stimulates researchers to rethink potential reporting biases.

*We agree with this overall assessment. In our revised draft, we have attempted to frame the analysis in terms of larger issues such as measurement error and reporting biases. We added some context to the introduction on p. 4, as well as to the discussion section, which underwent the most major revisions. We believe that these additions will make the paper more relevant to a larger readership.*

*In addition, on p. 12 of our revised draft, we identify a number of epidemiologic studies that have recently used proxy-reports of height and weight to estimate BMI. We hope that the identification of such studies helps broaden the potential applicability of our research.*

Minor essential revisions:
Introduction

1. There is a brief description of the methodological changes in NHIS between 1996 and 1997. The reader may be interested in more detail, for example: Has the sampling methodology changed, too? Changes in data analysis/data cleaning? The CDC website (http://www.cdc.gov/nchs/about/major/nhis/hisdesc.htm#sample_design) says for example that from 1997 on CAPI was used and that the questionnaire was revised. This may have influenced survey results, too.

*We have added a paragraph in the methods section (see p. 5) to provide additional details about the NHIS redesign. While we agree that various methodological changes could have affected BMI estimates – as they have other health conditions – we also believe that the evidence suggests that the elimination of proxy-reporting is primarily responsible for the sudden upward swing in BMI in 1997. Note, for instance, that estimates for self-reported BMI are quite consistent from 1996 to 1997 (see Figure 2).*

Methods

1. Mode of administration should be described (telephone or face-to-face?)

*Good point. We clarify mode of administration in the methods section (p. 4).*

2. How were households selected?

*As we now note on p. 4, "Households and the individuals within households are selected via a complex, multistage sampling design that involves both clustering and stratification."*

3. How can data be a combination of self-report and proxy-report? Does one person start the interview, and someone else continues? What is the "n" for partial self-report?

*This is our understanding. We attempted to clarify the definition of partial self-report, as well as the sample size, by changing the text as follows: "Partial self-report designates persons whose data were a combination of self- and proxy-reports. This means that either the participant or another adult member of the household responded to questions regarding height and weight but, unfortunately, researchers cannot adjudicate between these two possibilities. Between 1976 and 1996, 81,405 participants (about 5% of the NHIS sample) were classified as partial self-reporters." (see pp. 5-6)*

4. Is there another way to group marital status? "Not currently married" does not mean "not living with someone in the household". Maybe "currently in a relationship and living together" and "single" would make more sense?

*We agree that this particular grouping of marital status is less than ideal. However, we required a consistent coding scheme across all waves of NHIS where our correction procedure applied (i.e., 1976-1996). A category for cohabitation was not introduced until the 1997 redesign of NHIS. We attempt to clarify these issues by expanding our discussion of the marital status groupings on pp. 6-7.*

Discussion

1. The discussion should be longer and more detailed. Limitations of the study have to be discussed.

*As mentioned, we expanded the discussion section considerably in our revised draft. Our main reason for doing this was to expand the paper's purpose from a very specific technical report to one that speaks to larger issues of measurement error and reporting bias. We think that by addressing the limitations and by expanding the 'narrowness' of*

*the topic we have made the paper more relevant to researchers who use proxy-report data and those who are concerned about the validity of BMI data.*

2. It should be discussed in more detail that the adjustment for self-report vs measured height/weight may be even more important than the adjustment for proxy reported height/weight. Results should be compared to measured mean BMI, e.g., data from NHANES (http://www.cdc.gov/nchs/data/ad/ad347.pdf) say that mean BMI (national US, ages 20+) was 26.7 for men; 26.5 for women (1988-94) and 27.8 for men; 28.1 for women (1999-2002). These results suggest (when compared to NHIS) that the difference in results between self-reported and measured is bigger than the difference between self-reported and proxy-reported which would mean that adjustment would be even more important for self-report vs. measured, and that current results are still a big underestimation of true values.

*This is a very good point. We have included a discussion of these issues in the text (pp. 14-15) and have included a new figure (see Figure 4) that shows NHANES clinically-assessed data in comparison to BMI estimates from NHIS that (a) make use of our correction for proxy-reporting and (b) apply a standard BMI correction procedure, once proxy-reporting is accounted for. As we discuss, discrepancies between corrected NHIS estimates and NHANES examination data present opportunities for future research and also warn against the uncritical application of standard BMI correction procedures.*

3. Are there other potential explanations for the change in prevalence between 1996 and 1997? May other methodological changes (not only proxy reporting) have contributed to the mean BMI coming closer to reality from 1997 on?

*Other methodological changes may be at play, but we believe that their contribution must be relatively minor. If only self-reported data are used, there is a smooth increase in NHIS estimates of mean BMI between 1996 and 1997 (see Figure 2). This strongly suggests that prior estimates were suppressed primarily by the inclusion of proxy- and partial self-reports of weight.*

Discretionary revisions

Title

1. A new procedure…. Why "new"? Is there an old one? Or could it just be "a procedure"?

*We think this is a nice suggestion and we have changed our title accordingly.*

References

1. 15. "Kleinbaum" not "Klienbaum"

*We have corrected the spelling, and we apologize for the error.*

Methods

1. "Measures": "Body weight is measured with BMI".. this should rather be "Body mass is measured with BMI" or "Overweight status is measured with BMI"

*You are correct. We have changed the text to read "Body mass is measured with …"*

Overall

1. In several places, the paper gives the impression that there was an "artifactual increase" in mean BMI between 1996 and 1997. "Artifactual increase" sounds like the values have become too high which is not the case (in contrast, they are probably still too low due to underestimation through self-report). It should be stressed that the problem is that before 1997 the mean BMI was systematically underestimated.

*The use of the word 'artifactual' has been minimized in this draft. We also took your suggestion and added a sentence about how BMI estimates prior to the 1997 NHIS redesign were underestimated even more than the post-1997 BMI estimates as a result of proxy-reporting.*

**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Acceptable

**Statistical review:** Yes, but I do not feel adequately qualified to assess the statistics.