Author's response to reviews

Title: Trends in childhood obesity and central adiposity between 1998-2000 and 2010-2012 according to household income and urbanity in Korea

Authors:

Jinwook Bahk (jwbahk@snu.ac.kr)
Young-Ho Khang (yhkhang@snu.ac.kr)

Version: 5 Date: 15 October 2015

Author's response to reviews: see over
We thank the reviewer for the helpful comments. We have responded to each comment and revised our manuscript. The revised sentences were highlighted in yellow in the manuscript.

**Reviewer:** Malavika Subramanyam

**Reviewer's report:**

Major Compulsory Revisions

1. Abstract, methods: Please mention that the trends were gender-specific.
   
   **OUR RESPONSE:** We added the ‘gender-specific’ in the sentence (line 28 in the revised version).

2. Abstract, methods: Please add information about source of data in the abstract. It was only when I reached the methods section of the article that I found out that this study used two repeated cross-sectional surveys.
   
   **OUR RESPONSE:** We added the following sentence in the method section of the Abstract (line 27-28 in the revised version).
   “The repeated cross-sectional data from Korean National Health and Nutrition Examination Surveys in 1998-2001 and 2010-2012 were used.”

3. Abstract, results: Please include direction of difference (urban>rural?) when mentioning the prevalence gaps in childhood obesity between urban and rural areas.
   
   **OUR RESPONSE:** We rewrote the sentence to clarify the direction of urban-rural difference (line 39-41 in the revised version).
   “In addition, compared with the childhood obesity prevalence among boys in rural areas, the prevalence among urban boys were slightly lower in 1998-2001 but became greater in 2010-2012.”

4. Abstract, conclusions: These need to be more specific to the findings of this study. Also, I didn’t understand what kind of “gaps in childhood overweight and obesity” the conclusions were referring to. The conclusions are stated in very general terms and so it is difficult to understand what the conclusions are and how they fit with what was found.
OUR RESPONSE: Based on the reviewer’s comment, we revised the conclusion section (line 43-46 in the revised version).

“This study revealed gender difference in the association of childhood obesity with household income and urbanity and its time trends. The long-term gender-specific monitoring of socioeconomic and urban-rural differences in childhood obesity measures is warranted in South Korea.”

5. Background: “Prior studies have shown that individuals with higher SEP showed stabilized or declining trends in childhood obesity, while those with lower SEP showed increasing trends.” Please add a mention of where (which countries) these prior studies are from.

OUR RESPONSE: The studies showing the patterns described in the sentence were from Australia and England. In the revised version, we added the country information as suggested (line 56 in the revised version).

6. Background: “Major cities showed stabilized or decreased childhood overweight prevalence over recent decades, whereas other areas showed increasing prevalence.” Please mention which countries these “major cities” are located in. Or you could say “Globally, major cities such as X and Y.” Also, it is unclear what you mean by “other” areas. Do you mean rural areas? Please be specific.

OUR RESPONSE: Since we referred to studies from the Netherlands and Switzerland, we added the country information in the sentence. Also, we added ‘other smaller cities and rural areas’ to clarify the sentence. Please see line 58-60 in the revised version.

7. Background: “It is unclear whether time trends in childhood overweight and obesity and central adiposity differ according to SEP and urbanity.” Have no previous studies examined this question in the South Korean context? If so, please state that explicitly.

OUR RESPONSE: In the ‘Background’ section, we documented that “to the best of our knowledge, no studies have examined the time trends of both childhood obesity and central adiposity according to SEP and urbanity” (line 68-69 in the revised version). We don’t think that additional statement is necessary.

8. Background: “….using repeated cross-sectional nationally representative samples…”
Please mention how many samples were included.

OUR RESPONSE: We added the sample size (6016) and reworded the sentence (line 75-76 in the revised version).

9. Methods: The section describing the operationalization of household income and urbanity needs more detail. Is this annual or monthly income? Was the information obtained in response to a single question in the survey? If not what were the questions used? How were answers to multiple questions combined to produce a single income variable? How reliable is the income data? What was the definition used to classify an area as urban or not? At the minimum a reference to the administrative definition of urbanity should be included.

OUR RESPONSE: Information on household income was obtained with questions on monthly and annual income. A question on monthly income was used in 1998 and 2001 while questions on both annual and monthly income were employed in 2010-2012. Regarding the urbanity, the urban-rural categorization was based on the administrative classification of the Ministry of Public Administration and Security in South Korea. The basic administrative unit, dong in Korean, from major metropolitan cities and small- and medium-sized cities was considered as urban areas while other basic administrative units, eup and myon in Korean, were considered as rural areas. Regarding these, we added sentences in the method section. Please see line 94-96 and 100-103 in the revised section.

10. Methods: Please add a note justifying the use of multiple criteria for defining overweight and obesity.

OUR RESPONSE: We added the following sentence to justify the use of the four criteria of childhood overweight and obesity.

“A prior Korean study employed these four criteria and found similar time trends of childhood obesity prevalence between criteria [11]. In this study, we employed the four criteria and examined any differences by criteria in the relationship of childhood obesity measures with household income and urbanity and its time trends.” (see line 126-130 in the revised version)

11. Results: In general, recommend organizing the results section using sub-headings. Perhaps the first sub-section can present results on general trends in BMI, WC, overweight
and obesity and the second sub-section can present results related to the relationship between income and urbanity with the outcome variables.

OUR RESPONSE: Based on the reviewer’s comment, we organized the results section using four sub-headings: (1) changes in BMI Z-scores by household income and urbanity, (2) trends in body mass index and waist circumference by household income and urbanity, (3) trends in the prevalence of childhood obesity by household income and urbanity, and (4) trends in the prevalence of childhood overweight by household income and urbanity.

12. Results: There are a few sentences along the lines of “Analyses of household income also produced similar patterns, in which disparities according to urbanity develop in opposite directions according to gender, but there was no statistically significant interaction between SEP and time period (Table 3).” This was confusing to me. I think it would make more sense to substitute “household income” for “urbanity.” Or re-word it in this manner “Analyses of household income also produced results similar to those of urbanity—disparities according to household income develop in opposite directions according to gender, but there was no statistically significant interaction between income and time period (Table 3).”

OUR RESPONSE: Thank you for the suggestion. Based on the reviewer’s suggestion, we revised the sentence (see line 239-242 in the revised version).

“Analyses of household income also produced similar results to those of urbanity. Disparities according to household income develop in opposite directions according to gender, but there was no statistically significant interaction between household income and time period (Table 3).”

13. Results: “….but a significantly expanding disparity of childhood obesity among girls according to WHO criteria was observed.” Unclear what kind of disparity this phrase refers to.

OUR RESPONSE: We rewrote the sentence to make it clearer (line 244-246 in the revised version).

“but a significant increase in the urban-rural gap of childhood obesity among girls according to WHO criteria was observed (P for interaction = 0.0483) (Additional file 2: Table S2).”
14. Discussion: “Moreover, the impact of the early childhood socioeconomic environment on later obesity and associated etiologically relevant periods may differ by gender [26, 27].”

Please a sentence here describing the impact differing by gender, i.e what the two patterns are.

**OUR RESPONSE:** Prior studies from France and the Netherlands cited in the sentence (reference #26, #27) showed that strong associations of early life social disadvantages with adulthood obesity were observed in women but not in men. We added a sentence regarding this point (see line 304-306 in the revised version).

15. Discussion: “Overall time trends of overweight and obesity prevalence between 1998-2001 and 2010-2012 among girls showed a plateaued pattern in this study. Moreover, time trends in childhood overweight and obesity prevalence between 1998-2001 and 2010-2012 according to SEP and urbanity showed no significant trends among girls. However, among boys, overall time trends of obesity prevalence between 1998-2001 and 2010-2012 showed a stabilized pattern, but the overall time trends of overweight prevalence were increasing. Based on the IOTF criteria, boys with high household income and urban residency showed increasing time trends in obesity and overweight prevalence between 1998-2001 and 2010-2012. In addition, statistically significant interactions of obesity prevalence between urbanity and time period were detected among boys, indicating significantly widening gaps in the prevalence of childhood obesity according to urbanity between 1998-2001 and 2010-2012. Among girls, statistically non-significant obesity prevalence gaps by urbanity were observed, but the directionality of the gap was the opposite (obesity prevalence in rural areas was higher than in urban areas). The results regarding gender differences in diverging urban/rural patterns for childhood overweight were similar, albeit statistically non-significant.” This entire portion belongs in the results section and not in the discussion section. Please delete all of this and please add more text to the discussion that interprets the results and situates them in context.

**OUR RESPONSE:** As suggested, we deleted all of the sentences and added one sentence. Please see line 309-310 in the revised version.

“Results of this study showed different time trends in childhood overweight and obesity by household income and urbanity.”

16. Discussion: “Prior studies demonstrating increasing socioeconomic inequalities in childhood obesity and overweight have indicated that the prevalence of childhood obesity
among high SEP groups has stabilized or decreased whereas low SEP groups have shown increasing trends.” Please mention the geographic areas where these prior studies were conducted.

OUR RESPONSE: The studies cited were from England, France, and Sweden. In the revised version, we added the country information as suggested (line 310 in the revised version).

17. Discussion: “Prior studies demonstrating increasing socioeconomic inequalities in childhood obesity and overweight have indicated that the prevalence of childhood obesity among high SEP groups has stabilized or decreased whereas low SEP groups have shown increasing trends [28, 4, 29]. Other studies have shown that overweight prevalence in major cities have stabilized or decreased whereas the prevalence of overweight has increased in other areas [6, 7].” These sentences are almost identical to the ones in the introduction section. They need to be re-phrased. And the geographic areas they refer to need to be explicitly mentioned.

OUR RESPONSE: Based on the reviewer’s suggestion, we re-phrased the sentences. Please see line 310-316 in the revised version.

18. Discussion: “…gender differences in body perception and early childhood factors.” Need more information about this. What are these gender differences? What is the directionality of the differences? What might be the reasons for these differences? How do they fit the Korean cultural context?

OUR RESPONSE: Based on the reviewer’s comments, we added the following sentences in the discussion section. Please see line 321-329 in the revised version.

“Among South Korean girls aged 10-19, early childhood socioeconomic disadvantages, which would be a strong predictor of low household income and rural residency, might be associated with adolescent obesity, as prior studies from other countries suggested [26, 27]. However, this would not be the case for South Korean boys. Rather, adolescent urban environments which allowed better access to high caloric western food might have contributed to an increase in adolescent obesity prevalence among South Korean boys aged 10-19 residing in urban areas. Weight misperception might have been less important in reducing obesity in South Korean boys as in South Korean girls.”
Minor Essential Revisions

1. Keywords: Recommending adding the word “trends” to the list of keywords.
   OUR RESPONSE: We added ‘trends’ as a keyword as recommended (line 48 in the revised version).

2. Methods, study subjects: “A total of 6016 participants..” Please insert the phrase “Data from” at the beginning of this sentence.
   OUR RESPONSE: We inserted the ‘Data from’ as suggested (line 88 in the revised version).

3. Results: “Subjects living in rural areas decreased by about 11 percentage points” Please add the phrase “Proportion of” at the beginning of this sentence.
   OUR RESPONSE: We inserted “The proportion of’ as suggested (line 155 in the revised version).

4. Results: “Figure 1 presents changes in the distribution of BMI Z-scores among boys and girls in 1998-2001 and 2000-2012 according to household income status (high vs. low) and urbanity. In 2000-2012, a large part of the BMI Z-score distributions were positive among boys regardless…” Should it be “2010-2012” and not “2000-2012”?
   OUR RESPONSE: Thank you. We corrected it (line 160-161 in the revised version).