Author’s response to reviews

Title: Diet Quality Trends Among Adults with Diabetes by Socioeconomic Status in the U.S.: 1999-2014

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Author’s response to reviews:

Dear Dr. Roger Gutiérrez-Juárez and Reviewers of BMC Endocrine Disorders,

Thank you for providing the opportunity to revise and resubmit our manuscript. We greatly appreciate your critical and insightful feedback. The comments provided have significantly strengthened the manuscript. We have revised the manuscript according to the feedback provided. Below we detail the specific changes made to the manuscript. Thank you for the opportunity to revise and resubmit our manuscript.

Sincerely,

Colin J. Orr MD MPH
Reviewer reports:

Maria Koltowska-Haggstrom (Reviewer 1): Overall, it is a very well written paper on important issues for the management of diabetes. The presented data are essential for public health and may contribute to improve patient outcomes in this patient population. I have a few comments to be addressed, and some suggestions which may be used in this paper or be addressed in a separate study.

Comments to be addressed in this paper:

1. Page 2, Line 15: NHANES - should be spelled out in the abstract
Response: We have now spelled out “National Health and Nutrition Examination Survey” on page 2 Line 15 in the abstract.

2. Page 6, Line 41: Federal poverty level - it would help to get at least one sentence of description particularly for non-US readers
Response: We have now added the following sentence to clarify the federal poverty level and Poverty-Income Ratio (on Page 6 Line 43, in the Methods section):

“This divides the participant’s household income by the applicable poverty threshold for the year of data collection and for a household of the participant’s size. For example, the federal poverty level for a family of four in 2019 is $25,750, and if the participant’s income was $32,125 and they had a household size of 4, their PIR value would be 1.25 or 125% of the federal poverty level.”

3. Page 11, Line 29: SES- this abbreviation appears for the 1st time here and needs to be spelled out
Response: We have now spelled out “socioeconomic status” on page 12, line 31, in the Discussion section.

4. Discussion: How do HEI scores look in general population, or other diseased population? Please, include it in the discussion, it would give better understanding of the problem and a wider perspective
Response: We have added the following on Page 13 Line 50 in the Discussion “Contextually, the increase in HEI score among participants in this study was similar to improvements in the HEI score among adults living in the United States overall. For US adults, the overall mean HEI in 1999-2000 was 46.6 (45.0-48.2) with an increase to 49.6 (48.9-50.4) in 2009-2010. The higher HEI score among those in this study compared to estimates of the overall US population was may be due to greater dietary counseling provided patients with diabetes relative to the general population”

5. Figure in the main manuscript and Figures 1a-c in the revised supplemental tables: the HEI scale ranges from 0-100, and thus the y axis should be anchored 0-100. I agree that then the chart will be much less powerful and the differences may disappear. Nevertheless, showing it in the way as it is now, causes a severe misinterpretation and is perceived as manipulation. Maybe you could use different way of presenting these data.

Response: We have revised the figures to show a y-axis of 0-100, although we note that 0-100 is the range of HEI scores, not the range of mean HEI scores, which is what Figure 1A-1C depict.

Overall I miss the analysis vs. the clinical data. I would suggest analysing impact of

1. type of diabetes
2. duration of diabetes
3. medication for diabetes
4. HbA1c
5. BMI

Response: Thank you for this comment. For this paper our overarching goal was to examine trends in diet quality as they related to socioeconomic factors (income, education, and food insecurity), in individuals with diabetes. We agree that exploring trends in diet quality as related to other aspects of diabetes (including type of diabetes, diabetes duration, medication use, HbA1c, and BMI) would be interesting research questions in their own right. However, given the space limitations and the focus of the paper, we do not think we could do justice to these analyses in the present manuscript. We have added a discussion of the additional analyses in the ‘future directions’ (page 14 Line 21 in the Discussion excerpted below):
“This study suggests several directions for future research. Additional analyses could explore the trends in diet quality by other aspects of diabetes such as: type of diabetes, duration of diabetes, medication use, HbA1c, and BMI. These analyses would help advance the care of adults with diabetes and potentially identify groups which need additional support in improving diet quality”

Francis Finucane (Reviewer 2): Reviewer comments for BEND-D-19-00084.

This paper describes a large repeated cross sectional analysis of NHANES at two time-points in adults with diabetes mellitus, examining changes over time in the quality of their diets, measured with the HEI, and also assessing the impact of education, income and food security on diet quality. There was a modest overall increase in dietary quality over 14 years. This was more or less equivalent size to the differences between the different socioeconomic categories, so that having low education, being poor or having low food security is approximately equivalent to losing 14 years of progress for affected individuals.

This is an outstanding paper. The introduction is clear, concise and well written. The methods are also clear - aside from a typographical error at the top of page six, there are no other problems with it. The results are clearly laid out in an accessible and meaningful way. The discussion is excellent. The tables and figures are fine. The authors are to be congratulated on an outstandingly clear and carefully drafted paper that will improve the understanding of the challenges faced for those with socioeconomic disadvantage.

Response: Thank you.

Gudrun Dieberg, PhD (Reviewer 3): This is an interesting investigation into the dietary quality in adults with diabetes over time from 1999 to 2014.

The authors are using data from 8 cycles of the National Health and Nutrition Examination Survey (NHANES) for the analysis.

Although dietary quality has increased overall; disparities continue to exist.

Not surprisingly, dietary quality varies depending on socioeconomic factors like education, income and food security.

The data presented in Supplemental Table 3 are not discussed - why include them? Should they be discussed? I think so!
HbA1c has not changed in the last 7 cycles. Could this have something to do with increases in medication (e.g. Metformin)?

Also, BMI has not improved, in fact it is probably getting worse - diet quality? Etc

Response: Thank you for these comments. We agree that several findings in Supplemental Table 3 deserve mention in the main manuscript. We have now added the following sentences to highlight the change in HbA1C and BMI during the course of the study (page 10, line 26 in the Results section, excerpted below)

“Overall mean BMI was 32.8 (32.4-33.1) and increased from 31.9 (31.0-32.8) in 1999-2000 to 33.5 (32.6-34.4) in 2013-2014 (Supplemental Table 3). Mean glycosylated hemoglobin decreased from 7.78 (7.42-8.15) in 1999-2000 to 7.18 (7.00-7.35) in 2013-2014”.

We have also added a discussion of these findings (page 14, line 7. In the Discussion Section), excerpted below:

“Despite improvement in diet quality over time, BMI increased over the course of this study, a temporal trend observed in other studies among those with diabetes26,36 and without diabetes37. This is likely attributable to multiple individual and environmental factors.38 Additionally, we observed a decrease in glycosylated hemoglobin over time, consistent with temporal trends of earlier diagnosis and more intensive medication management for adults with diabetes.27,28”

Minor correction for authors -

Abstract line 18 - you might want to mention that you included 8 cycles.

Response: We have revised abstract to include “eight” on page 2 line 15 in the abstract section.

Methods page 6 line 1 - last word change 'od' to 'of'

Response: We have revised this to “of” (page 6, line 7, Methods Section).

Results page 9 line 31 - the HEI score should be 51.3 instead of 49.4

Response: We have corrected this to 51.3 (page 10 line 38, Methods Section).
Same page line 43 - should the p value be added here - p<.001?
Response: We have added the P-value as requested (page 10 line 51, Results).

Same page line 48 - Figure 1 A?
Response: We have added a callout to Figure 1A (page 10 line 56, Results Section).

Same page line 53 - add p value? and refer to Figure 1 B
Response: We have added the p-value and a callout “Figure 1B” (page 11 line 7, Results Section).

Results page 10 line 12 - refer to Figure 1 C
Response: We have now added the callout to Figure 1C to the manuscript (page 11 line 19, Results Section).

Discussion page 11 line 7 - comprising 8 NHANES cycles
Response: We have revised the language as suggested (page 12 line 8, Discussion section).

Same page line 29 - 'years behind the diet quality of their higher SES peers.' insert 'their'
Response: We have revised the language as suggested (page 12, line 31, Discussion section).

Same page line 43 - start sentence with 'however' - I think it reads better
Response: We have revised the language as suggested (page 12, line 48, Discussion section).

Discussion page 12 line 9 - 'Importantly, a healthy dietary pattern need not be expensive.' true - however, it is certainly easier when you are better off and when you have learned it from an early age. I would like to see a bit more discussion on this.
Response: Thank you for this interesting comment. We agree having a healthier diet is more easily obtained if one has resources and has been taught from a young age to demonstrate healthy eating behaviors. We have added the following to the manuscript (page 13 line 12, Discussion, excerpted below):

“Importantly, it is possible to achieve higher dietary quality without significantly increasing cost, as recently demonstrated in a community-based study largely enrolling low-income participants.31 Early development of healthy eating habits can be difficult in a stressed social environment.32,33 but there is evidence that cooking and sharing meals at home is associated with better diet quality.34 These observations suggest a potential role for educational interventions as a way to address SES disparities in diet quality while recognizing socioeconomic factors may not be easily changed—and that individuals with lower SES should not be blamed for the factors that promote unhealthy diets.

Discussion page 13 line 21 - 'lower SES and/or food insecurity' insert 'and/

Response: We have revised as suggested (page 15, line 21 Conclusions section).

References - please format carefully - some references have complete journal name and others are using abbreviations

Response: We have revised as suggested. We do note however that for the reference manager style used, some journals have an abbreviated title while other journals, particularly with short names, use the full title.

Table 1 - in the line 'Mexican American' change 9..0 tp 9.0

Response: We have revised as suggested.

Supplemental table 1 - explain abbreviations in legend

Response: We have added explanation of the abbreviations in the legend.
Supplemental table 2 - insert 'who' and delete 'a' in '... those who answered yes to being told s/he...'

Response: We have revised as suggested.

Supplemental table 3 - please include units

Response: We have revised as suggested.