Francesco Visioli, PhD

Associate Editor

*Frontiers in Nutrition – Nutritional Epidemiology*

Dear Dr. Visioli,

We thank the editors and reviewers for their careful assessment of our manuscript and constructive comments. Please find our detailed responses submitted.

We have also uploaded two revised manuscripts (tracked and cleaned manuscripts).

Thank you for your interest in our manuscript and we look forward to hearing from you soon.

With best regards,

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Comments from Referee:

**Referee:1**

The paper by Wang et al. represents an important study to document the relationships between food groups and eating time slots according to diabetes status. Overall, this is an interesting study, which confirms associations between evening/night and consumption of pudding, soft drink, sugar confectioneries, chocolates, spirits, beers, ice cream, biscuits, and crisps for all adults in the UK. Sweetened beverages, sugar-confectioneries appeared more strongly associated with evening/night among un-diagnosed diabetics. Foods consumed in the evening/night time tend to be highly processed, easily accessible, and rich in added sugar or saturated fat. Individuals with undiagnosed diabetes are more likely to consume unhealthy foods at night. The results are interesting and important to inform the health authorities about the prevention of diabetes in adults.

**RESPONSE:** Thanks for your positive evaluation of our manuscript. We have modified the manuscript according to your comments and recommendations.

1. The results of this study are based on a representative sample of the population with large sample size and detailed baseline information on dietary and lifestyle determinants. As a main concern, detailed information on the validity of the dietary questionnaire is lacking. The authors need to better justify the dietary assessment method chosen (photos at every eating occasion, participant self-report and photo images of meal times (with time stamps), provide references for the validity or utility of this method. The numbers of food records for analysis are large, nevertheless, it must be acknowledged that the patterns identified make sense, and that they strongly relate to lifestyle factors and diabetes risk.

**RESPONSE**: Food records are considered as the gold standard in nutrition epidemiology. Four-day food diary method in the NDNS RP was also compared against repeated 24-hour recall prior to the start of NDNS RP. A comparison study was conducted in a subset of the sample and has been reported in the Appendix A of survey report. Briefly, the findings suggested that the response rates for the two methods were similar, and the four-day food dairy was considered to be a more flexible and adaptable method to cover wide population age range in the survey. Furthermore, the same food diary method is widely used in large studies conducted in the UK, such as the MRC National Survey of Health and Development (NSHD) (1946 British Birth Cohort) [1], the EPIC Norfolk Study [2], the UK Women’s Cohort Study in Leeds [3], and the Avon Longitudinal Study of Parents and Children (ALSPAC) cohort [4]. Validation study of the food records against double-labelled water has also been undertaken among a subset of NDNS sample. Full results of the analysis have been reported in the Appendix X of the official survey report. [5]

We have added description regarding the validity of the dietary recordings in the manuscript.

[1] Price, G. M., et al. "Characteristics of the low-energy reporters in a longitudinal national dietary survey." British Journal of Nutrition 77.6 (1997): 833-851.

[2] Bingham, Sheila A., et al. "Nutritional methods in the European prospective investigation of cancer in Norfolk." Public Health Nutrition 4.3 (2001): 847-858.

[3] Cade, Janet E., et al. "The UK Women's Cohort Study: comparison of vegetarians, fish-eaters and meat-eaters." Public Health Nutrition 7.7 (2004): 871-878.

[4] Glynn, L., et al. "Food and nutrient intakes of a population sample of 7‐year‐old children in the south‐west of England in 1999/2000–what difference does gender make?." Journal of Human Nutrition and Dietetics 18.1 (2005): 7-19.

[5] Lennox, A., et al. Appendix X. Misreporting in the National Diet and Nutrition Survey Rolling Programme (NDNS RP): summary of results and their interpretation. Available from:

<https://fsa-catalogue2.s3.eu-west-2.amazonaws.com/ndns-appendix-x.pdf> (accessed 2021-06-15)

1. The authors should inform in the introduction section on diabetes prevalence data in the UK National Diet and Nutrition Survey.

**RESPONSE:** We have added description on diabetes prevalence in the NDNS RP sample. It was reported that 3.4% of men and 2.3% of women aged 19-64 years were found to have glucose concentration above 6.9 mmol/L. The proportion of men with undiagnosed diabetes increased with age to over 20% but not in women (2.1%) [5].

[5] Almoosawi, S., Cole, D., Nicholson, S., Bayes, I., Teucher, B., Bates, B., Mindell, J., Tipping, S., Deverill, C. and Stephen, A.M., 2014. Biomarkers of diabetes risk in the National Diet and Nutrition Survey rolling programme (2008–2011). J Epidemiol Community Health, 68(1), pp.51-56.

1. How was sample size calculated?

**RESPONSE:** This is a cross-sectional survey study that has been designed to be nationally representative of the UK and has an annual sample size of 1000 adults. It is a general surveillance tool of the nutritional health of the population, it was not powered to answer specific scientific hypotheses but to maintain the representativeness of the UK population through the years.

1. What was the inclusion and exclusion criteria for selection of the participants?

**RESPONSE:** This is a nationally representative survey that includes all children and adults living in UK who are aged 4 years and above. There is no specific limits to inclusion and exclusion criteria as it is designed to be representative of UK population. However, we restricted the food diary recordings to those who aged 19 years or older (adult population)

1. Were participants who reported following a strict diet (i.e., vegan, coeliac/gluten free, or ketogenic) excluded?

**RESPONSE:** This data is only available for a limited number of survey members and has not been included in the analysis due to the high prevalence of missing data.

1. The lack of information on waist circumference (or waist-to-height ratio) and physical activity is a limitation of the study, and it should be mentioned, since abdominal obesity and sedentary lifestyle are the main mediating pathways that lead to diabetes.

**RESPONSE:** We agree that physical activity and waist circumference are important in assessing the risk of diabetes. However, due to missingness these variables were not investigated. We have added this limitation to the discussion section of the manuscript.

1. The total intake and consumption of pudding, soft drink, sugar confectioneries, chocolates, spirits, beers, ice cream, biscuits, and crisps should be compared according to diabetes status (healthy, pre-diabetic, undiagnosed, diabetic) to find out if the intake of pudding, etc., in diabetics and non-diabetics is presumably accurate, so the magnitude should be explored of this problem. A sensitivity analysis could be performed.

**RESPONSE:** Thank you for your comment. Conducting and analysing food groups individually is similar to multiple testing and could result in false positive results simply due to inflated type I error. The primary reason for conducting CA was to avoid previous pitfalls associated with analysing focusing on individual food groups, hence results of individual group analyses are not reported here.

1. Table 2 should also be adjusted for BMI.

**RESPONSE:** Thanks for the suggestion. The table and the results of the logistic regression models with GEE were updated now with additionally adjustment for BMI.

1. Figures cannot be understood, cannot be read, have no title. The authors need to resubmit the graphics.

**RESPONSE:** We are sincerely sorry that previous figures were not readable. Figures were reproduced and uploaded according to the resolution requirements of the journal.

1. Spirits food has very high Odds and very wide confidence interval in all groups analyzed, probably due to a very small "n". Therefore, this association is very imprecise and should not be included in the conclusions. The authors should explain this association in the discussion and clarify what these foods groups are.

**RESPONSE:** We agree that the association for spirits is imprecise and therefore we have removed spirits from the main results as you suggested.

1. The authors have described the relationship between food groups and eating time slots in diabetics and non-diabetics participants. In addition, the authors have studied how such relationships may vary by status diabetes. One concern is that the results of this study are conditional on the diagnosis of diabetes. That is, diabetic participants require a dietary strategy and have different lifestyles than non-diabetics. So, if we focus only on diabetics, it would be interesting to add a table stratified by years diagnosed, or by controlled and uncontrolled diabetes, if possible.

**RESPONSE:** Thanks for the interesting recommendation. In the current analysis, we defined diagnosed diabetes as self-reported or under treatment for diabetes, therefore these participants are aware of their conditions. Therefore, as expected we found that they were avoiding foods such as puddings during later time of the day. On the other hand, undiagnosed diabetics were defined as either fasting glucose >= 7.00 mmol/L or HbA1c >= 6.5% but they did not report/were not aware that they have diabetes (un-diagnosed diabetes). Unfortunately, controlled or uncontrolled, years of diagnosis are not available from the NDNS RP data. We are really sorry we cannot perform further stratification based on these variables.