

PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form (<http://bmjopen.bmj.com/site/about/resources/checklist.pdf>) and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below.

ARTICLE DETAILS

TITLE (PROVISIONAL)	Dietary intake and sources of sodium and potassium among Australian schoolchildren: results from cross-sectional Salt and Other Nutrients in Children (SONIC) Study
AUTHORS	Grimes, Carley; Riddell, Lynn; Campbell, Karen; Beckford, Kelsey; Baxter, Janet; He, Feng; Nowson, Caryl

VERSION 1 - REVIEW

REVIEWER	Ferruccio Galletti Federico II University of Naples, Italy
REVIEW RETURNED	12-May-2017

GENERAL COMMENTS	<p>The aim of t Grimes' paper was to examine i) sodium and potassium urinary intake according to socioeconomic status, ii) discretionary salt use habits and iii) dietary sources of sodium and potassium in Australian schoolchildren. The study is well reported and the conclusions are interesting although they are not novel and already reported in others country population samples. In addition several points must be addressed to confirm the authors' conclusion.</p> <ul style="list-style-type: none"> - First of all, the response rate is too low considering both the schools invited (11%) and the participating school's consent (6%) - It is well known that sodium intake and body weight are strongly and directly related; authors do not take this into account, whereas they need to adjust all comparisons also for weight - As the authors themselves state, in their population sample there is a low prevalence of overweight and obesity: this is crucial considering the previous point <p>- The significant difference in 24 hours urinary sodium excretion between the in- and out-school collections could in part invalidate the conclusions reached.</p>
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REVIEWER	Zerleen Quader CDC, USA
REVIEW RETURNED	12-May-2017

GENERAL COMMENTS	<p>Line 7: Revise to "666 of 780 children aged 4-23 who participated in the Sonic Study returned a completed 24-hr urine collection."</p> <p>Introduction:</p> <p>Not necessary, but a suggestion is to address the fact that food habits and preferences develop at a young age – this provides support for conducting studies in children.</p>
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	<p>Lines 58-59: authors describe the importance of monitoring progress of sodium initiatives. This study doesn't specifically address the progress of any initiatives, rather supports the continued monitoring and reduction of sodium intake. Suggest adding statement about why this study is needed, and why we would want to monitor intake and know which food categories are contributing to sodium intake in children.</p> <p>Methods:</p> <p>Line 77: it appears ref #25 that provides the methodology for the study is attached as supplemental material – if this is the case, please reference it as such so the reader knows they can access it.</p> <p>Lines 89-96: This paragraph is unclear and would benefit from more detail. Please add additional information regarding measures of discretionary salt use, i.e. what questions were used, possible responses – I see there is a reference at the end, but having the questions would be helpful as it part of the objective of this analysis. Otherwise, could add this as supplementary material. Also add a definition of the term “discretionary salt” – salt added at the table or during cooking. Lines 94-96 state that “this information was collected retrospectively” – not clear if this is referring to just SES data or demographic data and discretionary salt data. If both, please move to beginning of paragraph or specify. Also not clear which “data could only be obtained in..” – 254 students were asked about SES and 160 responded?</p> <p>Line 112: how many children in the “sub-sample”?</p> <p>Lines 136-139: “this information can help.....food required” -- these sentences should not be in the methods – move to intro, as this provides the rationale for analysis. Then delete previous sentence “In addition....discretionary foods” as it is repeated in the next sentence (line 139-140).</p> <p>Line 156: It seems as though Standard Errors (SEs) should be reported in this analysis, especially since you are comparing means between groups</p> <p>Results:</p> <p>Line 180: This is the first mention of the UL – add a definition and the cutoff values for the UL in the methods.</p> <p>Table 1, Figure 1 and 2: add a more descriptive titles, include units. Table 1 title could not stand alone as is. The titles should let us know what is going to be in the table/figure. Ex. For figure 1: “daily percent contribution of sodium”</p> <p>Table 1: are these means (SD)? If so, why are SEs not reported? Other supplementary tables include SE's but methods state SD. SE would be more informative. This table should also be reformatted to include all the subgroups mentioned in the objectives for analysis, including SES. Results suggest there are differences by SES, so why is that not in a table? Suggest showing sodium, potassium, and Na:K by age group, sex, and SES all in one table.</p> <p>Supplementary table 1: revise columns – very unclear which ones</p>
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	<p>are n's and which are means. Every subgroup should have an N, so that should be a separate column, then either mean or % in the next column, and specify which is which next to variable name.</p> <p>Discussion: Paragraph 3: consider adding more information regarding discretionary salt use in Australia – i.e. what proportion of total sodium consumed comes from discretionary salt, why is it important, comparisons to any other countries.</p> <p>Lines 332-334: Revise sentences to: "...Healthy Food Partnership, which provides..." "In moving forward with salt reduction in Australia,"</p> <p>Lines 353: Remove "e.g. pricing, policy, and consumer education" – if not providing further detail or examples of these, I would remove as it shouldn't be introduced in the last sentence.</p>
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VERSION 1 – AUTHOR RESPONSE

We thank both reviewers for their time and the comments provided. We believe consideration of these suggestions has enabled us to improve the quality of our revised manuscript. A detailed response to each point raised by the reviewers is found below.

Comment 1:

The aim of t Grimes' paper was to examine i) sodium and potassium urinary intake according to socioeconomic status, ii) discretionary salt use habits and iii) dietary sources of sodium and potassium in Australian schoolchildren. The study is well reported and the conclusions are interesting although they are not novel and already reported in others country population samples. In addition several points must be addressed to confirm the authors' conclusion.

Author response 1:

We appreciate that data describing salt intake by measurement of 24hr urine collection is available for other pediatric population groups however, it is important that country specific data is available to enable appropriate monitoring and formation of policies to help combat high salt intakes, across different regions.

Comment 2:

First of all, the response rate is too low considering both the schools invited (11%) and the participating school's consent (6%)

Author response 2:

We agree the response rate is low and the discussion has been further modified to acknowledge this line 387-390 e.g. "Limitations of the study include the convenience sample and low response rate, which although comparable with other studies requiring 24-hr urine collections 56, limits the generalisability of the findings to the wider population. Furthermore, it is possible that child participants were from families that were more health-conscious than non-respondents."

Of note, difficulty in obtaining a high response rate in studies using 24-hr urine collections is relatively common (Hawkes & Webster, 2012 Plos One 7: e46727) with comparable response rates of 10% in Switzerland, with particular difficulties in obtaining 24hr urine samples among children reported. Other studies conducted in children have reported response rates of 26% in the UK (Marrero et al. 2015 Hypertension 63: 1026-32 and 22% in Spain (Aparicio et al. 2015 Eur J Nutr: 56:171-78). In adults in

Australia, response rates of 16% and 5% (Land et al. BMC Public Health 16: 388) have been reported. 24hr urine collections are the only objective measure of dietary sodium intake and as at least 70% of dietary sodium is present in the manufactured foods eaten in developed countries, sodium intake is primarily related to the amount of salt added to the food supply. We have recently demonstrated that sodium excretion does not differ between volunteer/motivated subjects and the general population who are willing to undertake 24hr collections (Land et al. BMJ Open 2014; 16;4(1):e003720)

Whilst, the low response rate is a limitation of the study it should still be noted that obtaining an objective measure of salt intake utilising 24-hr urine collection, which is free from issues such as misreporting error associated with dietary survey methods, is also a strength of the present study.

Comment 3

It is well known that sodium intake and body weight are strongly and directly related; authors do not take this into account, whereas they need to adjust all comparisons also for weight

Author response 3:

Thank you we agree salt intake is positively related to body weight. As suggested we have revised our analysis and adjusted regression models for BMI–zscore (as age and gender are already in the models). Of note this lead to no appreciable changes for the findings related to urinary electrolyte excretion across age group and sex and we have indicated this with a footnote at the bottom of Table 1 line 567

In line with reviewer no 2 comment 12 we have added tabulated results for urinary electrolyte excretion by SES (Table 2 – line 571). As suggested we have revised to include a model that adjusts for BMI z-score (model 3). This additional analysis has led to some minor changes in the interpretation of the findings and the manuscript has been revised throughout to reflect this i.e. results in text line 228-238, discussion line 338. We have also amended the statistics section to reflect the updated analysis Line 185-193.

Comment 4:

As the authors themselves state, in their population sample there is a low prevalence of overweight and obesity: this is crucial considering the previous point

Author response 4:

Yes, within the discussion we acknowledge that compared to national estimates there is a lower prevalence of overweight and obesity within the sample. As indicated in the response above additional adjustment of BMI z-score within models does not appreciably alter the results.

Comment 5:

The significant difference in 24 hours urinary sodium excretion between the in- and out-school collections could in part invalidate the conclusions reached.

Author response 5:

In the paper we report that there is some indication that salt intakes are higher among children of lower socioeconomic background. Of note this finding has been adjusted for relevant covariates, including day of the week of urine collection. Hence it is unclear how the 'difference in 24 hours urinary sodium excretion between the in- and out-school collections could in part invalidate the conclusions reached', as we believe the impact of such differences have been accounted for appropriately within the analyses.

Comment 1:

Line 7: Revise to “666 of 780 children aged 4-23 who participated in the Sonic Study returned a completed 24-hr urine collection.”

Author response 1:

This has been amended.

Introduction:

Comment 2:

Not necessary, but a suggestion is to address the fact that food habits and preferences develop at a young age – this provides support for conducting studies in children.

Author response 2:

Thank you, we agree food habits and preferences develop early in life and sodium intake can influence these, and we have revised this section to reflect this Line 52.

Comment 3:

Lines 58-59: authors describe the importance of monitoring progress of sodium initiatives. This study doesn't specifically address the progress of any initiatives, rather supports the continued monitoring and reduction of sodium intake. Suggest adding statement about why this study is needed, and why we would want to monitor intake and know which food categories are contributing to sodium intake in children.

Author response 3:

Thank you. The introduction (Lines 70-82) has been revised to include further information on study rationale.

Methods:

Comment 4:

Line 77: at appears ref #25 that provides the methodology for the study is attached as supplemental material – if this is the case, please reference it as such so the reader knows they can access it.

Author response 4:

Yes ref no. 25 which is no 26 in the revised manuscript refers to the published study protocol. In our original submission we added this publication as supplementary data as per the BMJ Open author instructions, but given the reference for the research protocol, which has been published in an open access journal is provided, we would ask the editor if this is acceptable. Thank you for your assistance.

Comment 5:

Lines 89-96: This paragraph is unclear and would benefit from more detail. Please add additional information regarding measures of discretionary salt use, i.e. what questions were used, possible Author responses – I see there is a reference at the end, but having the questions would be helpful as it part of the objective of this analysis. Otherwise, could add this as supplementary material. Also add a definition of the term “discretionary salt” – salt added at the table or during cooking.

Author response 5:

Thank you. We have amended this section of the manuscript to include a definition for discretionary salt and include further information on the questions used to assess discretionary salt use. Lines 104-110.

Comment 6:

Lines 94-96 state that “this information was collected retrospectively” – not clear if this is referring to

just SES data or demographic data and discretionary salt data. If both, please move to beginning of paragraph or specify. Also not clear which “data could only be obtained in..” – 254 students were asked about SES and 160 responded?

Author response 6:

Thank you to clarify the retrospective data collection relates only to the SES data. We have amended this section (lines 114-1172) to reflect this along with additional information related to the 2nd query.

Of note, further detail related to the retrospective data collection is described in the published study protocol (ref no. 26) which is included here.

Comment 7:

Line 112: how many children in the “sub-sample”?

Author response 7:

The number of children who completed a 24-hr dietary recall was n=498. This has been added to the manuscript line 1349.

Comment 8:

Lines 136-139: “this information can help.....food required” -- these sentences should not be in the methods – move to intro, as this provides the rationale for analysis. Then delete previous sentence “In addition....discretionary foods” as it is repeated in the next sentence (line 139-140).

Author response 8:

We agree, as suggested this information has been removed from the methods section lines 156-160 and the rationale for examining sodium from core foods and discretionary foods has been inserted into the introduction, Lines 73-78.

Comment 9:

Line 156: It seems as though Standard Errors (SEs) should be reported in this analysis, especially since you are comparing means between groups

Author response 9:

As suggested we have revised the manuscript to include SEs throughout. Please note for clarity track changes were not used on Table 1 and instead a new revised table was inserted.

Results:

Comment 10:

Line 180: This is the first mention of the UL – add a definition and the cutoff values for the UL in the methods.

Author response 10:

To clarify the first mention of the Upper Level is within the methods section line 182. We believe the journal’s readership would be familiar with this recommendation and no definition has been added however as suggested we have added in the cut-off values specific for each age group (Lines 182-183)

Comment 11:

Table 1, Figure 1 and 2: add a more descriptive titles, include units. Table 1 title could not stand alone as is. The titles should let us know what is going to be in the table/figure. Ex. For figure 1: “daily percent contribution of sodium”

Author response 11:

As suggested all table and figure titles have been revised and appropriate amendments made.

Comment 12:

Table 1: are these means (SD)? If so, why are SEs not reported? Other supplementary tables include SE's but methods state SD. SE would be more informative. This table should also be reformatted to include all the subgroups mentioned in the objectives for analysis, including SES. Results suggest there are differences by SES, so why is that not in a table? Suggest showing sodium, potassium, and Na:K by age group, sex, and SES all in one table.

Author response 12:

As per the previous comment (no. 9) results have been revised to report SEs throughout the manuscript.

With regards to tabulation of results as per demographic descriptors stated in the aim (e.g. age, gender, socioeconomic status), we have done this in Table 1 for age group and gender. Due to formatting and presentation of a table it was not possible to add 3 further sub-groups to table 1 for SES.

However, as suggested to help with the interpretation of the findings related to urinary electrolyte by SES we have added an additional table (2) that presents the multiple linear regression results by SES.

Comment 13:

Supplementary table 1: revise columns – very unclear which ones are n's and which are means. Every subgroup should have an N, so that should be a separate column, then either mean or % in the next column, and specify which is which next to variable name.

Author response 13:

Thank you for this feedback. As the only characteristic for which the data relates to a mean is the continuous variable 'age (years)' we have removed this from the table. This finding is already reported in the in text results section and helps to improve the readability of the table.

Discussion:

Comment 14:

Paragraph 3: consider adding more information regarding discretionary salt use in Australia – i.e. what proportion of total sodium consumed comes from discretionary salt, why is it important, comparisons to any other countries.

Author response 14:

Thank you. Whilst there is no country specific data available for Australia, estimates are based on the limited data available from the UK (James et al. 1987) and US (Mattes et al. 1991), which indicate that discretionary salt accounts for ~15% of intake, compared to ~75% of intake from processed foods. This information has been added to the manuscript (lines 316-317) and in addition we have indicated that although, discretionary salt contributes less than processed foods it is still an important source to target.

Comment 15:

Lines 332-334: Revise sentences to: "...Healthy Food Partnership, which provides..." "In moving forward with salt reduction in Australia,"

Author response 15:

Suggested revisions have been made (lines 379-380).

Comment 16:

Lines 353: Remove “e.g. pricing, policy, and consumer education” – if not providing further detail or examples of these, I would remove as it shouldn’t be introduced in the last sentence.

Author response 16:

Thank you for this suggestion. We would argue that it is important to note that a range of comprehensive strategies are required to reduce salt intakes among children and we believe this detail speaks to this.

VERSION 2 – REVIEW

REVIEWER	Ferruccio Galletti Federico II University of Naples, Italy
REVIEW RETURNED	21-Jun-2017

GENERAL COMMENTS	The authors satisfactory replied to the questions raised
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REVIEWER	Zerleen Q CDC, USA
REVIEW RETURNED	05-Jul-2017

GENERAL COMMENTS	Well written and interesting. Only 2 minor revisions: Results, line 206: Please indicate whether there were any difference in K or Na:K by age group, type of school day, etc. as was done for sodium excretion. If this was examined and there are no difference, that can also be stated. Discussion, line 309-313: Have the discretionary salt use questions validated? This is also something to consider and report on here. Additionally there may be some differences in interpretation of words like "usually" or "sometimes"
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VERSION 2 – AUTHOR RESPONSE

Reviewer: 1

Reviewer Name: Ferruccio Galletti

Institution and Country: Federico II University of Naples, Italy Please state any competing interests or state 'None declared': None declared

Comment 1:

The authors satisfactory replied to the questions raised

Reviewer: 2

Reviewer Name: Zerleen Q

Institution and Country: CDC, USA

Please state any competing interests or state 'None declared': None declared

Well written and interesting. Only 2 minor revisions:

Comment 1:

Results, line 206: Please indicate whether there were any difference in K or Na:K by age group, type of school day, etc. as was done for sodium excretion. If this was examined and there are no difference, that can also be stated.

Author response:

Thank you for this suggestion. The analysis for K, Na:K ratio by sex and age group was already presented in table 2. As suggested we have added text at line 207 to indicate these findings. To be consistent in our reporting, we have also added in text results for the same findings related to sodium at line 198.

As suggested we have added text (lines 210) related to the findings for excretion of K and Na:K ratio by day of urine collection.

Comment 2:

Discussion, line 309-313: Have the discretionary salt use questions validated? This is also something to consider and report on here. Additionally there may be some differences in interpretation of words like "usually" or "sometimes"

Author response:

Thank you, as suggested we have amended the limitations section of the manuscript line 380-384 to cover the issues raised in relation to assessment of discretionary salt use.