Dear Editor Iversen and reviewers,

First of all, the authors would like to express their gratitude to the two reviewers who allocated their time and effort to give constructive criticism. Below you will find some comments to the feedback given from the reviewers as well as a clarification on what changes have been done in the revised manuscript. All line numbers refer to the final version. In order to see the changes, please refer to the final version with the changes tracked.

**Reviewer 1**

**The manuscript titled “The contribution of school meals to energy and nutrition intakes of Swedish Children in relation to dietary guidelines” aims to describe the contribution of school meals to Swedish children’s nutrient and energy intake during weekdays and compare this to the reference values based on the Nordic Nutrition Recommendations (NNR). A national representative sample of school children (grades 2 and 5, n=1905, response rate 76 %) participated in a dietary survey in 2003 where the data was collected by a 4-day food diary with amounts estimated in household measures. A further 65 children were excluded as they did not report on any school meals. For those included, mean values across the school meals were calculated per individual. The contribution of the school meals to the children’s overall intake is presented in percent. The energy and nutrients consumed were compared with the values for 30 % of the dietary reference values (DRV) from the Swedish guidelines for school meals or NNR for those without a reference in the guidelines. The results showed that at the group level the school meals contributed around 27 % of the daily intake of nutrients, but varying from nutrient to nutrient and between individuals.**

**Furthermore, the results indicated that the meals contributed to little of dietary fiber, PUFA, Vit D, Vit E and too much SFA and sodium. The authors conclude that the study pointed to some central nutrients in need of improvement, but also that these results might have been caused by methodological weaknesses.**

**The manuscript addresses an important issue of contribution of the publicly paid school meal to the overall quality of the diet of Swedish school children using high quality data and clear reference standards.**

**However, the manuscripts suffer a bit from the fact that the data were collected long before the Swedish guidelines for the school meals which the authors consider this study could be a baseline for. I would recommend a careful read through to ensure that this is kept out of the aims and the conclusions on these, and rather include its potential as a baseline as strengths and limitations.**

Thank you for this comment. We have omitted all claims of this being a baseline study now. Please refer to our discussion on future study design in the discussion, lines (458-465).

We agree that there is a problem with the data being collected in 2003. A new nationally representative study on children is planned to be carried out in the future, but until then we wanted to make use of this high-quality set of data already collected. Moreover, although they have looked slightly differently over the years, the National Food Agency has published guidelines for school meals since the beginning of the 1980s, so in that sense Sweden has had nutritional guidelines for school meals for many years, although they haven’t been compulsory to follow until the Education Act was enacted.

**I think it would further strengthen the manuscript as an independent study if the following additional analysis were considered. Would the conclusions change if:**

**only those with 4 days of school lunch were include ?**

We agree that only including 4 days of school lunch would take the variation from different days of consuming school days into greater consideration than also including pupils with <4 days of school meals. In order to compensate for this, we used the mean values of the school lunches. We have discussed this is lines 466-473. However, if we had only included those with 4 days of school lunch it would have resulted in exclusion of a lot of children. Since these are secondary analyses, the main aim of “Riksmaten – barn” was not to study school meals only, and thus, some children also registered on weekends. So not only would including only those with 4 days of school lunch exclude those who had school lunch less often than on a regular basis, but also those who had registered part of their 4 days on weekends. In this way, we would include a bias in our analyses and therefore we have chosen to include all individuals.

**- only those with complete school meals were considered?**

The national food survey on which these secondary data were based studied all meals consumed by the children and thus did not have the school meal only in interest. School meal menus were collected whenever possible, but not all schools provided menus and sometimes served something else than what was on the menu. Moreover, this information was mainly used for assisting in coding and did not specify actually served amounts. Thus, comparison of reported school meal consumption with which was actually offered is not possible. We have discussed that future studies should include the collection of school meal menus (458-465).

**- alternatives to the school meals were compared to the school meals?**

We agree that this sounds interesting. However, in Sweden there are no real alternatives to the school meal, such as for example vending machines, and since school lunches are served for free, there is no tradition of bringing your own lunch to school. A majority of the children studied reported that they eat their meals at school. In order to confirm this, we looked at the number of children who had for instance consumed their meals at a fast food restaurant or who had bought their lunch from a grocery store, but they were very few. Thus, for the children studied in the present study, the quantity of data for such an analysis would be insufficient. We have described the Swedish context in relation to this reviewer comment in the manuscript in order to explain this for international readers (lines 106-107 and 221-226).

**Minor comments:**

**Introduction, line 132-133 – is “for lunch” missing in this sentence?**

That is correct and has now been added (line 140).

**Methods, line 188 – add “in the sample” after “evenly represented”?**

This has been added.

**Methods, line 219 – Could the lunch eaten at school have been brought from home/outside?**

No, no one brings their own food since school meals are served for free. This has been specified in lines 106-107 and 221-226.

**Methods, line 229-230 – should “mean” be added before “daily intake” at the end of the sentence?**

We used the mean intake for each individual when it comes to 1) Intake of energy and nutrients from school meals and 2) Intake of energy and nutrients in total during these days. Based on these figures, we calculated the percentage. This has been clarified in the manuscript; please refer to lines 235-238.

**Discussion, line 386 – seems strange to talk about having followed guidelines that were not yet implemented. Delete or rewrite?**

We understand that this may come across as strange. If average requirements or lower intake levels had been available for children in Sweden we would have used those figures, but unfortunately these only exist for adults. Therefore we chose to compare the children’s intakes to the Swedish guidelines for school meals, which are based on the Nordic Nutrition Recommendations. This has been specified (lines 239-245).

**Tables – in general the table headings are long and much of this information could be placed as footnotes.**

Some of the information has now been placed as footnotes.

**Tables 2-4 - add a vertical line between the two grade levels. Call the second column “Reference values” and elaborate on SG and NNR in a footnote.**

This has been done.

**Reviewer 2**

**The authors present a paper with the title ”The contribution of school meals to energy and nutrient intakes of Swedish children in relation to the dietary guidelines”. The aim of the study stated was to describe the contribution of school meals to Swedish children´s nutrient and energy intake during weekdays and compare this to the recommendations in Nordic Nutrition Recommendations.**

**In the Introduction part of the paper several European guidelines and policies regarding school lunches are discussed. The aims of these school policies are to improve child nutrition, to teach healthy diet and lifestyle habits and to prevent childhood obesity.**

**It is pointed out that the health perspective has been evident since the introduction of school meals in Sweden in 1946. Include in Sweden, line 109.**

We have added this in the manuscript.

**It is also pointed out that goal has gone from malnutrition now to energy imbalance. Has this perspective been mirrored in the Swedish guidelines? The results from “Riksmaten barn” in 2003 showed that 20 % of the children were overweight or obese and 25% of energy intake came from energy dense foods of poor nutritional quality. This must be a challenge to offer meals not to be reduced in energy but to be of high nutritional quality. This could be discussed more in the Introduction part.**

The nutrient density may be a problem, for example regarding quality of fat, fibres, vitamin D and iron, which was also shown in the results in the article. The guidelines mention the results from “Riksmaten barn”, pointing to the fact that many children have too many food items of poor nutritional quality during the day. Regarding the school meal, they stress that part of the problem with energy imbalance is that many pupils do not eat enough school lunch (i.e. the amount that has been planned for). If the pupils do not consume enough, it becomes impossible to reach the reference values. Thus, the biggest challenge might not be to make the school lunches more nutrient dense. Although it is challenging for some nutrients, it is feasible, so the biggest challenge is rather to get the children to eat the amount intended in order to reach the reference values. We have elaborated on this in the introduction (lines 117-123).

**In the end of the Introduction section it is stated that the present study may serve as a baseline study against which follow-up studies can be compared in order to assess whether the law on nutritious school meals has had an effect or not. To be this baseline study and draw this conclusion the design would have included more detailed data, the quality of the meals at the different schools, what part of the meals were omitted, also to study underreporting for example.**

Thank you for this comment. We do no longer claim this to be a baseline study and have discussed what the future design of such a study should look like in the discussion, please refer to lines 458-465.

**In the part “Selection of participants” the Ethical approval must be included.**

According to Swedish law at the time when the data was collected, the study was not in need of ethical approval. This has been specified in the paper (lines 174-176) together with a statement that written approval was obtained from both headmasters and the child’s parents.

**In the Results the total energy intake for the two groups, grade 2 and grade**

**5 must be include and with relation to NNR recommendations. Figure 1 must also be given for the two groups separated.**

This information has been included (lines 316-320). Figure 1 has been divided into two figures: Figure 1 and Figure 2, which are intended to be placed next to each other in order to allow for comparisons. We have also rewritten this section in the results (lines 315-333).

**An important point to discuss deeper is how the two age groups reach the reference values.**

We have included this in the discussion (lines 425-446). In another manuscript that is forthcoming, we will elaborate more on differences between groups.

**From methodically point of view is their differences in data collection, did the younger group get more help from their parents compared to the older group? Could be especially for the intake at school lunches? How did you check for this information?**

No, there was no difference in data collection. Children in grade 2 and grade 5 either registered themselves or with the help of an adult. We have discussed this in the discussion as a possible limitation (lines 444-446).

**In the discussion a Finnish study is referred to concerning intake of the main course but also of the intake of milk, salad and bread. Why is it not possible to do the same in this study? Do you include these components in the calculation of energy and nutrients or not? It will give much more value to the study if you get figures for what is served and what part of the meal is omitted and for each age group.**

Yes, everything that the pupils had to eat during school lunches has been included. We have clarified this (lines 228-230).

In many ways, the Finnish study and the present study are not comparable. The Finnish study had a different aim, looking specifically at school meals. They also used another method, a questionnaire, and the participants were older (attended grades 7-9). The national food survey (“Riksmaten barn”) on which these secondary data were based, studied all meals consumed by the children and thus did not have the school meal only in interest. Still, school meal menus were collected whenever possible, but these were used to aid in the process of coding and not all schools provided menus. Moreover, sometimes the schools served something else than what had been printed on the menus. Therefore, we cannot know for sure what the children were offered; only what they consumed. Moreover, there were no specific questionnaire items directed towards the children asking them what components of the school lunch that they usually eat. This is something that we will take into consideration for the future. We have elaborated on this in the manuscript (lines 458-465).

**Both in the Abstract, line 46, must the word school meal be included, the same in the tables 2-4.**

This has been added in the manuscript.

**It is a limitation with many reports in Swedish among the references and not all references are available to be uploaded.**

We are aware of this problem. In order to aid the reader, we have translated the titles. The Swedish reports are mainly from the original study on which these secondary analyses were conducted. However, the main report includes a summary in English. We have added this information in the manuscript (reference 3). Please note that we in general have added new [URL:s](file:///\\livsmedelsverk.se\upp\Users\wube\RAPPORT\Meriter\Manus\Osowski\s) since some web pages have been moved since we submitted the manuscript.

Kind regards,

The Authors