Reviewer's report

Title: Calcium and magnesium in drinking water and diet as cardiovascular risk factors in individuals living in hard and soft water areas with differences in cardiovascular mortality. A cohort study.

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Reviewer: Petra Graham

Level of interest: A paper whose findings are important to those with closely related research interests

Advice on publication: Unable to decide on acceptance or rejection until the authors have responded to the compulsory revisions

This paper presents the results of a study that investigates the intake of magnesium and calcium in drinking water and diet and its associated effect on cardiovascular risk factors.

Discretionary revisions: None.

Compulsory revisions:

General comments:

The paper needs to be checked carefully for spelling, typographical and grammatical errors, for example the use of "riskfactor" throughout the document and "bear" on page 5. It is suggested that the authors use a native English speaker to check the paper.

The authors should define acronyms such as SBP and DBP used both in the text and in tables. This will help readers without a medical background or with a differing medical background to understand the paper.

P-values should always be shown even when not significant. This is important because interpretations based on p-values may be different depending on the level of significance chosen for the tests.

Specific comments:

Background:

On page 3 it is not clear what is meant by the hardness of water being of considerable influence compared to major risk factors.
The wording of the background appears to be a bit unclear. At the beginning water hardness is described as being a risk factor for cardiovascular disease and at the end it appears to be described as influencing cardiovascular risk factors. Please be sure that your objectives are very clear and precise.

It would also be useful for readers without a background in CVD if the authors would describe the risk factors for CVD, particularly those that are of interest in this paper.

It would be useful to clearly identify how this study differs from previous studies.

Methods section:

The methods section should appear after the "background" and before the "results" section.

The first paragraph describes a random sample of 120 individuals selected from each of two communities. How did the authors ensure that only 40-59 year olds were included in the random sample? Why were 33 of the 240 selected subjects not included in the study? A more detailed description of the sampling method would be useful.

It would be useful for the authors to include units for all of the characteristics measured (eg weight, height, etc).

In the methods section the authors describe that 67 subjects received muscle biopsy. How were these subjects chosen from among the 207 study participants?

The reference to Swedish standards (Bergstrom, 1979) is quite old. Are the authors sure that standard portion sizes have not changed since then? This reference could be moved to the reference section.

Is the Swedish Food Administration Food composition table named "Energy and Nutrient, 1993"? It is not clear what the authors are trying to say here. Is this a published reference? If so it may be useful to include it in the reference section.

It would be useful to describe when exactly Student's T-test is used as opposed to the Mann-Whitney U. It is difficult to comment on the appropriateness of test usage unless this is specified.

Which statistical package did the authors use to analyse their data?

Were there any missing values in the data set? Survey data are rarely complete. If missing values were found, what was done for these cases?

Results:

The first paragraph quotes community statistics. From where were these results obtained? A reference should be given. Can the difference between the community statistics and the study statistics for the West be explained? It would also be preferable if the columns in Table 1 were presented in the same order as the description in the text.

When the community does not supply water, what do people use?

Is the second paragraph using study statistics? If so, a boxplot of water hardness by region may help to strengthen this statement.
It is not immediately obvious that the results described in the third paragraph relate to Table 2. The authors need to define the acronyms/abbreviations shown each row of Table 2. The fifth paragraph describes positive correlation between calcium and magnesium in diet however this is not shown in Table 2. The two sentences in paragraph 5 appear to repeat the same results.

It might be easier to read Table 3 if only the correlations of interest (that is, calcium and magnesium in serum, urine and muscle with risk factors) were shown rather than all bivariate correlations.

Where linear regression analysis is used were the regression assumptions met? Were all of the variables significant in the model?

Comparisons of calcium intakes and magnesium intakes should be presented in different paragraphs. Statistical tests seem to have been performed on magnesium and not on calcium. It would be preferable to be consistent with testing unless there are specific reasons not to do this.

The authors need to be careful to ensure that results discussed are supported by the values shown in the tables. Neither Table 4a nor 4b show the statistics by sex. The authors describe household water as accounting for only small daily intakes of calcium however data in Table 4a suggests that local water is the third most important source of calcium for participants in the east. Chocolate is described as being an important source of calcium, however this appears to be far less true for participants in the east. The contribution to overall dietary intake of calcium from chocolate also appears a lot less than 7-11%. Please check these figures. Assuming that dietary intake of calcium and magnesium is an indicator of amount of product consumed, it is not really evident that participants in the west are consuming more potatoes. Chocolate, on the other hand, appears to be substantially different.

Non-significant p-values need to be shown in Tables 5-7 and percentages should be shown to the same number of decimal places. Please add the unit for measurement of age (i.e. years) to Table 5.

The second row of Table 8 is described as "mean population". It is unclear what this is showing.

Discussion:

The discussion appears to basically repeat the results. The discussion would ideally summarise the results and should guide readers in the interpretation of these results. The discussion should also address the aims of the study in light of these results. The discussion may also benefit from reordering. Keeping the discussion of the results of calcium together and similarly for magnesium might make the discussion flow more easily and look less like repetition of the results.

Many of the results present significant correlations. The authors need to concede that these values, although they are significantly more than zero correlation, are indicative of weak correlation at best. Similarly the coefficients of variation indicate poor model fit. Values such as those presented suggest that even though these items may be contributing factors, other variables may be the cause. Note that these comments are not intended to diminish the worth of the paper but are meant to increase the readers understanding of what is going on.

The use of rank correlation is appropriate in this paper but it might also be useful for the authors to note in the discussion that more complex relationships may exist that are not recognised by this technique.

The authors describe the regression results as showing complex interactions between risk factors and calcium however it was not evident from the results that interactions were examined in the regression
analysis. This needs to be investigated before the authors can conclude that the regression analysis showed evidence of complex interactions. The authors can however describe the possibility that complex relationships may be taking place.

All references should be placed in the reference section. The reference for British magnesium intake should be placed directly after the data that it refers to.

The authors describe, on page 8, that they have used the "best available methods for analysing magnesium and calcium". Is there a reference that will help to support the statement that this is the "best"? The sentence following this one does not make sense, what are body compartments?

Conclusion:

The conclusion should be revised in line with changes made to the discussion

**Competing interests:**

None declared.