Author's response to reviews

Title: Oral health and prosthetic status of an urban and rural population over 40 years in Shandong Province, China

Authors:

Qian Zhang (q.zhang@dent.umcn.nl)
Dick J Witter (d.witter@dent.umcn.nl)
Ewald M Bronkhorst (e.bronkhorst@dent.umcn.nl)
Nico HJ Creugers (n.creugers@dent.umcn.nl)

Version: 3 Date: 27 April 2011

Author's response to reviews: see over
Dear Editor,

Please find enclosed the revised manuscript MS: 7612420024783320, now entitled ‘Dental and prosthodontic status of an urban and rural population over 40 years in Shandong Province, China’ for your consideration to publish in BMC Public Health. We very much appreciate the meticulous work done by the reviewers and the detailed way they communicated their suggestions. Below you will find a point-by-point description of the changes made. We feel that following the comments and suggestions substantially improved the quality of the manuscript and hope that the manuscript is now acceptable for publication.

Looking forward to your response,

Sincerely,

Qian Zhang

List of changes:

*Italics: comment/suggestion of the reviewer; bold description of the changes made; action of the authors*

**Reviewer 1:**

1. **Background**
   1. Paragraph 1, last sentence: ‘More recent oral health......outcomes such as tooth loss’ - Why is it important to describe tooth loss? Add information to this effect.

   Two sentences were added (including a reference) to mention the importance to describe tooth loss: (1) ‘Tooth loss is an important predictor for oral health-related quality of life.' [Gerritsen AE, Allen PF, Witter DJ, Bronkhorst EM, Creugers NHJ, *Tooth loss and oral health-related quality of life: a systematic review and meta-analysis*. HQLO 2010, 8:126]. and (2) ‘A recently published systematic review provided evidence that location and distribution of tooth loss is associated with impairment of oral health-related quality of life as well as with the severity of the impairment [Gerritsen et al.]’

   2. Paragraph 2, sentence 4: ‘Unfortunately, DMFT does not provide.....different dental regions in Chinese adults (end of paragraph) – In relation to these statements you need to provide more information on

   1) the importance of functionality to older adults, for example, in terms of quality of life
   2) Rationale for describing tooth loss by dental region.
See also above; we hope that following (added) sentences address this comment sufficiently: (1) ‘Tooth loss is an important predictor for oral health-related quality of life.’ [Gerritsen et al.], and (2) ‘A recently published systematic review provided evidence that location and distribution of tooth loss is associated with impairment of oral health-related quality of life as well as with the severity of the impairment.’ [Gerritsen et al.]

II. Methods

1. More clearly describe how you define, ‘Urban’ and ‘Rural’.

We feel it should be clear from the text that ‘urban’ is in the city ‘Qingdao City’. For ‘rural’ the following has been added; ‘... (a predominantly agrarian area with a low population density and a total population of approximately 36,000) ...

2. How was the sample size calculated?

The following text has been added to the Methods section: ‘To calculate the sample size needed, it was decided that the sample should allow for multiple logistic regression with at least 12 independent variables amongst dentate subjects. This implies that at least 120 observations of the least prevalent part of a dichotomous variable amongst dentate subjects are necessary. Using 8% prevalence as a worst case scenario, a total sample size of 1500 is needed to attain the 120 observations needed. To allow for an estimated 5% prevalence of edentulous subjects, the targeted population was increased to 1575.’

3. Do you think the convenient sub-sample could have induced a bias in the study, especially since it was drawn from a health care centre, where as the remainder of the urban sample was randomly selected from the general urban population? This is a very important issue to address.

We agree that this is an important issue. However, we do not expect bias because of the chance of including subjects selected on the basis of health. Health check-ups are very common in urban China. It deals with a general population (‘normal’ community residents) and not with a hospital population (patients), as might have been suggested by the former text. Therefore we changed the text in this respect. The sentence has been changed into: ‘Subjects from name lists of a general health centre attending for periodic check-ups were invited to participate.’

In the discussion section we addressed this point as follows: ‘To deal with this, a pathfinder sampling method was used to find subjects from randomly chosen communities and factories. Eventually unfilled cells were filled with community residents attending a health centre for periodical check-up. Although the composition of this convenient sub-sample (which is 6% of the total urban sample) appeared to be slightly different from the total urban sample with respect to SES and gender (i.e. males above the age of 70 were not represented in the sub-sample), we consider that the urban sample reflects the population of Qingdao City.’

4. ‘For the rural sample...basis of accessibility’ – 1) You need to mention the criteria that were used to assess the representativeness of this county and 2) rural was defined on the basis of accessibility to what?

The rural site for investigation was chosen on the basis of representativeness (a for this region typical rural site), distance (approximately 100 km) to the
home city of the investigator, willingness of the local authorities to cooperate. There are no signs that the population of this county differs from other rural counties at the peninsula of Shandong. The sentence has been changed into: ‘For the rural sample, one county (Zhugou) considered representative for northeast Shandong Province was chosen on the basis of accessibility for investigating dental health status and cooperation from local authorities.’

5. Mention the reason for selecting rural villages based on GDP.

The reason for selecting villages based on GDP has been added to the text. GDP ranged from 0.33M RMB to 8.7M RMB; number of citizens of 40 years and older per village ranged from 74 to 734. We selected randomly 3 villages from GDP high, 4 from GDP middle and 3 from GDP low. In each category a small, middle and large sized village was chosen (in category middle GDP 2 middle sized villages were selected). The text has been edited accordingly.

6. Was the questionnaire a self-administered or interviewer-administered questionnaire? You mention ‘face to face interview’ in the text (which hints at it being interviewer-administered) and immediately following that you mention self-administered. If it was an interviewer-administered questionnaire, then the correct term to be used is ‘self-reported’ and not self-administered. More clearly explain this in the paper.

This part has been edited. We hope that it is clear now.

7. Was the questionnaire piloted before the survey? This is an important step in questionnaire development and should be addressed in the paper.

Yes. The text has been edited to address this point.

8. Socio-economic status is not a demographic variable. Correct this in sentence 6 of the section ‘Interview and clinical examination’.

This has been corrected.

9. You mention inter-observer reliability tests were conducted. What about intra-observer reliability?

Inter-observer reliability is more critical than intra-observer reliability. As inter-observer variation is wider than intra-observer variation we considered it appropriate to report on inter-observer agreement only. If the reviewer would find it necessary to mention also intra-observer reliability data, we can calculate these and add them to the text.

10. In the data analysis section you need to more clearly describe the logistic regression analyses. A logistic regression is conducted to identify an independent effect on the outcome variable i.e. the effect on the dependent variable by a particular independent variable after accounting for all other independent variables in the model. In relation to this procedure you also need to mention the process for selecting variables in the logistic model, such as, forward, stepwise, backward, or other selection methods.

The following text has been added to the Methods section:
In all multiple regression models only theoretical considerations were used to select the independent variables in the models. So statistical methods to select "strongest" variables, such as backward of forward selection were not applied.

III. Results
1. Paragraph two belongs in the ‘Methods’ section.

This paragraph has been edited and moved to the Methods section.

2. Logistic regression results (adjusted odds ratios) are usually presented along with the unadjusted odds ratio (OR), so as to help the reader get an idea of the change in magnitude of effect, when all variables are included in the model. Table 4, I assume are the adjusted logistic data, as you call it a logistic regression table. If it is the case, then it would be more useful to also include the unadjusted odds ratios, where each exposure variable has been analyzed in terms of the outcome variable by itself and not with other model variables.

Unadjusted odds ratios have been added to the table (new Table 3).

3. Table 5 would be more useful, if you show the actual values and not just the difference in scores. The actual proportions would be of more use than the 95% CI and p-value.

The values for D, M, and F ratios are now included in the table (new Table 4).

4. Section ‘Teeth replaced’, last 2 lines of paragraph 1, where is this information in the tables? If it is not shown in the tables, you should add a note to this effect.

This information is not presented in the tables. It would require an additional table, however with only few data. Nevertheless, we think this information is of value to the reader and therefore would like to keep it in the text. We tried to solve the problem by adding: ‘It appeared that ……’. We hope that this ‘note’ is what the reviewer intended.

5. Why is the percentage of dentate subjects with missing teeth different in Tables 3 & 6?

The headers were not clear and have been changed now. Table 3 (the new Table 2) is dealing with dentate subjects (meaning subjects that have at least one tooth; edentulous were subjects excluded) while Table 6 (the new Table 5) is dealing with subjects that are dentate in both jaws (subjects with one or both jaws edentulous were excluded).

IV. Discussion
1. Most of the 1st paragraph belongs in the ‘methods’ section.

A substantial part of this paragraph has been removed to the Methods section. Some parts have been removed from the text.

2. Again Socio-economic variables are different from demographic variables Please correct this in paragraph two.

This has been corrected.

3. Again, paragraph 4 is a ‘methods piece’ and is nothing to do with a discussion of your results.

This paragraph has also been edited and has been included in the Methods section.

4. Give comparisons supported by numerical data, for example, in the 1st sentence of paragraph 5 you state that “For a long time….than in rural areas (12)” – give the actual number(s) that you are referring to, from this study (12), to support your statement and also for comparison to the findings from your study.
This part of the discussion has been edited.

Similarly, in the next few sentences you mention comparable outcomes with other studies but do not provide the numbers that you are referring to. Providing the results from these other studies is necessary to make the comparison with your study.

The outcomes from the studies cited for comparison are now provided.

5. Paragraph 5, “The combination of high....for caries in rural areas” – What is the rationale behind this statement. It is a well-known fact that in old people, more teeth are lost due to periodontal disease than dental caries. So the sentence should be modified to something like “extraction is the main treatment for advanced tooth diseases in rural areas”.

The sentence has been changed accordingly.

6. Paragraph 5, “This might be because....rural region” – The word ‘preventive’ should be added before ‘dental care’ (‘accessibility to preventive dental care...’). The fact that teeth are being extracted indicates access to dental care, but the low proportion with fillings indicates lack of preventive care.

This has been changed accordingly.

Another reason for the low number of fillings in rural areas could be cost of care rather than access issues. If more low SES persons reside in rural areas then for them the more affordable treatment would be extraction rather than a more expensive filling (which might require multiple sittings).

We added the following two sentences: ‘An additional reason for the low number of fillings in rural areas might be higher cost of restorative care compared to tooth extraction.’ In the next paragraph the relative high percentage of tooth replacements compared to fillings is explained by ‘In rural areas, many dental care providers have been trained in traditional apprenticeships rather than at university level dental schools, and mainly provide pain relief by tooth extraction followed by prosthetic treatment [20]. For common dental problems caused by caries or periodontal diseases, these providers prefer to extract involved teeth, above treatments that would involve the retention of such teeth [20]. Moreover, they still seem to practice often rather unconventional prosthodontic principles, in which they tend to provide fixed dental prostheses for low prices rather than removable dental prostheses, even when only very few teeth are available as abutment teeth.’

We hope this point has now been sufficiently addressed.

7. A major part of the result was analysis by demographic and SES variables (logistic analysis), none of which have been discussed much.

The Discussion section has been edited substantially and we expect that this issue is addressed sufficiently now.

Also, there is no discussion related to the result of the analysis by dental region. These need to be addressed.

The following text has been added to the Discussion: ‘The differences found in this study amongst dental regions underline the importance to differentiate between dental regions [Gotfredsen K, Walls AW. What dentition assures oral function? Clin Oral Implants Res. 2007, 18 (Suppl 3):34-45]. The molar region
was significantly more affected by decay and tooth loss than premolar and anterior regions. Also, the premolar region in the upper jaw showed more often missing teeth than in the lower jaw.’

V. Conclusion
In the conclusion you need to address every aim that you have mentioned in the ‘background’ section. For example, one of your stated aim is ‘to determine influence of various demographic...and tooth replacements’ – in the conclusion you only mention the demographic variable (urban-rural), what about the other demographic and SES variables? All these need to be mentioned in the conclusion.

Gender, dental region and SES have been added to the discussion. The main findings are summarized in the conclusion as we tried not to repeat the discussion.

Similarly you have not addressed the last aim (WHO goal) in the conclusion.

This aim has now been addressed in the conclusion section.

General comments/Minor revision
1. In the title, the term ‘Oral’ should be replaced with ‘Dental’ as this study focuses only on teeth. Oral health is too general a term to be used in this study.

‘Oral health’ has been replaced by ‘dental health’ throughout the text.

2. The aims of the study should be uniformly stated in the abstract, background and discussion. The ‘Conclusion’ should address each of the mentioned study aims/purpose.

We feel that we have edited the aims of the study now more uniformly in abstract, background, discussion and conclusion.

3. Methods section of abstract needs more information.

More information has been added.

4. Results section of abstract has no information on prosthetic status.

Information on prosthodontic status has been added to this section.

3. Errors in word spelling.

These have been corrected.

4. Results section text is very lengthy. Only main results should be mentioned in results text, the rest is evident from the tables.

Parts of the text in the results section have been removed other parts have been edited.

5. The purpose/aims of the study need to be more clearly stated/well defined, particularly in the background section.

We feel that the aims of the study are now more uniformly stated in abstract, background, discussion and conclusion.

Reviewer 2:

General comments
1. The paper has some information about the oral health and prosthesis status of two urban and rural populations aged 40 or more. The title can be changed, since there are two populations. It is also a long title.

The title has been changed into ‘Dental and prosthodontic status of an urban and rural population over 40 years in Shandong Province, China’. (1 word less).

We do not understand the comment regarding “two urban and rural populations”. There are 2 populations: one urban and one rural.

2. Oral health is a general term and is not confined to dmft and prosthesis status. Dental health is preferred.

‘Oral health’ has been replaced by ‘dental health’ throughout the text.

3. The language of paper is poor and must be improved before any further decision.

The manuscript has been edited. We hope that the quality of language is now acceptable.

The text lacks some basic rules for scientific writing. The tense of verbs should be in past.

The tense of verbs has been changed into past tense.

4. The study type is cross sectional, and using words like risk, increase or decrease, influence, effect etc. is not allowed. These words are specific to case-control or other types of studies. The text should be revised accordingly.

To comply with the cross sectional entity of the study the words ‘risk’, ‘increase’, ‘decrease’, ‘influence’, and ‘effect’ are now avoided. They have been replaced by other words.

5. Please, be consistent. Please either “resident” or “citizen”. The complete name of variable is “place of residence”, so avoid residence.

This has been corrected throughout the manuscript.

Abstract
1. In the method part of abstract the details of variables were not explained.

Several details of the variables have been added.

2. The reason and benefits of showing the results based on jaws are not clear.

From the dental literature it is clear that mandibular anterior teeth are ‘survivors’ and that maxillary molars retain longer than mandibular molars. This was found in industrialized as well as in developing countries. There is substantial evidence that different types of teeth in different jaws show different survival. [Meskin L, Brown J Prevalence and patterns of tooth loss in U.S. adult and senior populations. Int J Oral Implantol 1988; 5: 59-60; Sayegh A, Hilow H, Bedi R. Pattern of tooth loss in recipients of free dental
treatment at the University Hospital of Amman, Jordan. J Oral Rehabil 2004; 31: 124-30; Müller F, Naharro M, Carlsson GE. What are the prevalence and incidence of tooth loss in the adult and elderly population in Europe? Clin Oral Implants Res 2007;18 (Suppl 3):2-14. To justify reporting on regions and jaws 2 references to systematic reviews have been added to the main text of the manuscript: [Gerritsen AE, Allen PF, Witter DJ, Bronkhorst EM, Creugers NHJ, Tooth loss and oral health-related quality of life: a systematic review and meta-analysis. HQLO 2010, 8:126] and [Gotfredsen K, Walls AW. What dentition assures oral function? Clin Oral Implants Res. 2007, 18 (Suppl 3):34-45]. We consider the fact that we did not see significant differences between the jaws in this population also as a result. To show this we prefer to leave the figures unchanged; multiple regression analysis was performed for upper and lower jaws combined (see Methods section)

3. The index is DMFT and should be written in the correct form all over the text.

DMFT is now used uniformly throughout the manuscript.

4. Tooth replacement is not clear. In methods, nothing is indicated in this regard. What index was used by the authors, how was measured.

Some information has been added to the method section in the abstract: ‘(teeth replaced either by fixed dental prostheses or removable dental prostheses)’. According to the glossary of prosthodontic terms we now have used the terms fixed and removable dental prostheses throughout the manuscript. As the other referee also brought up this point we add here the reaction to his comment: ‘There is no R index. Presence of RDP and FDP was registered as well as the teeth replaced by RDP and FDP. R\text{ratio} has been defined similarly as D, M and F ratios. In this calculation roots are defined as missing (see Methods section). R\text{ratio} has been used in: [Nguyen et al. Oral health status of adults in Southern Vietnam - a cross-sectional epidemiological study. BMC Oral Health 2010, 10:2].

5. In the results part, the following sentence is not clear: “The number of decayed teeth was relative low at all ages, however, an increase with age was noted for anterior teeth.” The word relative is not clear; in the results clear findings of the study should be brought. The word “however” is not suitable. In the results, the text should not explore any feeling regarding the findings;

The text has been edited.

…. and finally using the word increase is not correct, since the study is cross sectional, and the authors did not study a cohort to follow the increase or decrease or the changes through the time.

To comply with the cross sectional entity of the study the words that suggest changes through the time are now avoided throughout the text.

6. In the results, especially in the abstract, the reader expects to see the numbers and digits to compare the findings. Please avoid using words like low or high without the numbers and P-values.

Numbers and digits have been added.

Background

1. The first two sentences are not necessary. Please start the background with the
importance of dental caries and tooth replacement in adults.

The two sentences have been removed.

Method part
1. Page five, line 11. Please mention the number and percent of subjects who did not show up.

Number and percentage have been added.

2. It was not clear to me why the urban and rural subjects were selected according to different criteria?

For the selection of rural subjects lists of inhabitants with gender and age information were available. These lists were not (made) available for selecting subjects in the city. The criteria were not different; we only had to adapt the strategy for inviting the subjects for participation. Rural subjects were approached by local civil servants for voluntary participation using random lists with names. As a result age and gender cells could not be constructed in the same way as for rural. Some text is added to explain this matter. We feel (and hope) that the additional information provided in the text complies with the comments of both reviewers and that this point is now sufficiently clarified.

And also, was the GDP data, really, available for each village? The authors could arrange the villages according to the GDP list and select the required villages randomly from high to low.

GDP data were indeed available for each separate village. They ranged from 0.33M RMB to 8.7M RMB; numbers of citizens of 40 years and older ranged from 74 to 734 (for all ages the numbers ranged from 153 to 1583). We selected randomly 3 villages from GDP high, 4 from GDP middle and 3 from GDP low. In each category a small, middle and large sized village was chosen (in category middle GDP 2 middle sized villages).

3. Page 6, line 13-15. ..dental assistant. If needed, they read ..., and if applicable,

This has been changed accordingly.

4. Instead of location of residence, place of residence can be used.

This has been corrected.

5. The results part should be rewritten based on two rules: tenses should be changed to past, and the cross sectional entity of the study.

To comply with the cross sectional entity of the study the words ‘risk’, ‘increase’, ‘decrease’, ‘influence’, ‘trend’, and ‘effect’ are now avoided. They have been replaced by other words. The tense of verbs has been changed into past tense.

6. Page 9, last paragraph. The OR =1.018 with p-value = 0.001, is strange to me. OR =1.018 is equal to OR = 1.0 and is meaningless.

As stated in the manuscript this OR reflects a yearly (annual) difference of chances. This means that after a difference in age of 10 years results in odds of (1.018)$^{10} = 1.20$; a difference of 20 years will result in odds (1.018)$^{20} = 1.43$.

7. The reason and benefits of showing the results based on jaws are not clear.
From the dental literature it is clear that mandibular anterior teeth are ‘survivors’ and that maxillary molars retain longer than mandibular molars. This was found in industrialized as well as in developing countries. There is substantial evidence that different types of teeth in different jaws show different survival. [Meskin L, Brown J. Prevalence and patterns of tooth loss in U.S. adult and senior populations. Int J Oral Implantol 1988; 5: 59-60; Sayegh A, Hilow H, Bedi R. Pattern of tooth loss in recipients of free dental treatment at the University Hospital of Amman, Jordan. J Oral Rehabil 2004; 31: 124-30; Müller F, Naharro M, Carlsson GE. What are the prevalence and incidence of tooth loss in the adult and elderly population in Europe? Clin Oral Implants Res 2007; 18 (Suppl 3):2-14]. We consider the fact that we did not see significant differences between the jaws in this population also as a result. To show this we prefer to leave the figures unchanged; multiple regression analysis was performed for upper and lower jaws combined (see Methods section).

8. The reason and benefits of showing the results based on regions are not clear.

It has been demonstrated in a systematic review that location and distribution of tooth loss is associated with impairment of oral health-related quality of life as well as with the severity of the impairment [Gerritsen AE, Allen PF, Witter DJ, Bronkhorst EM, Creugers NHJ, Tooth loss and oral health-related quality of life: a systematic review and meta-analysis. HQLO 2010, 8:126]. The importance of present or absent teeth in different regions has also been emphasized in another systematic review [Gotfredsen K, Walls AW. What dentition assures oral function? Clin Oral Implants Res. 2007, 18 (Suppl 3):34-45]. Both references are now cited to provide the reason and benefits of showing the results based on regions. We hope that this point has been made clear now.

Another reason is that we intend to publish subsequent papers reporting on chewing ability and OHRQoL.

9. About the R index, what is the reference for the index?

There is no R index. Presence of RDP and FDP was registered as well as the teeth replaced by RDP and FDP. \( R_{\text{ratio}} \) has been defined similarly as D, M and F ratios. In this calculation roots are defined as missing (see Methods section). \( R_{\text{ratio}} \) has been used in: [Nguyen et al. Oral health status of adults in Southern Vietnam - a cross-sectional epidemiological study. BMC Oral Health 2010, 10:2.]

Results Part

1. Number of tables and figures is high, and is boring for the reader.

One table (Table 2) has been removed. We feel that the tables and figures that remain are needed to ‘tell the story’.

2. Table 3. Header: Percentages of dentate subjects \( (n=1525) \) with decayed, missing, and filled teeth- Please indicate to the total number of subjects in headers of tables.

Numbers of subjects have been added to the headers of tables. The header of (the new) Table 5 had to be edited accordingly.

3. The values for percentages could be rounded to make a simpler image for the reader, in all
This has been done at places that we considered it appropriate. At places were we considered that this would lead to loss of information we did not round percentages.

4. No trend can be estimated in the cross sectional studies, and subsequently the whole text should be revised accordingly.

The text has been revised to comply with the cross sectional entity of the study.

5. A long table (Table 2) has shown the SES classification details; however no sign of SES was detected in the results or was not prominent.

Table 2 has been removed. The text in the Methods section about SES has been edited accordingly.

6. Table 6. The header and the explanations in the rows should match. "Potential and realized tooth replacement" do not address Mean number of teeth (SD) suitable for replacement, and Mean percentage (SD) of teeth replaced. By the way, the values should be similar to be compared by the reader. One column is in number and the other is in percentage.

The header of (new) Table 5 has been edited. Comparisons in this table should be made by vertical comparison of age groups. We hope that the new header is pointing at this.

7. Please avoid reporting the percentage values in approximate, and bring the exact values in the results. For example in page 12: ‘dentitions’ comprising 20 or more teeth at old ages increased from less than 60% up to 80%. "Old ages" is not defined before; please use unique format for reporting the age variable. You can use the age classification you have defined in the method part in all tables and figures. "Less than 60%" is not clear; you can indicate to exact (rounded) percent.

Exact values are now indicated in the text. In accordance with (new) Table 3, where odds are presented for each additional year of age, we prefer not to present for age groups but for age as a continuous variable as displayed in Figure 6.

Discussion Part

1. Many points have been discussed in discussion, that nothing was reported about them in results.

The Discussion section has been edited substantially. We feel that the content of Results and Discussion better fit together now.

2. On the other hand, lots of data have been reported, that nothing was indicated about them in the discussion. The discussion is a continuum of results and should highlight the important parts of results.

See response to the issue above

3. The language of discussion part is poor and should be revised.

The discussion section has been edited with the help of authors experienced to write in English language. We hope that the quality of language is now acceptable.