

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)	Prevalence and factors contributing to dental caries in 12-15-year-old school adolescents in northeast China
AUTHORS	Li, Jian; Zhang, Kaiqiang; Lu, Zhenfu

VERSION 1 – REVIEW

REVIEWER	Meneghim, Marcelo Pontificia Universidade Catolica de Campinas
REVIEW RETURNED	18-Dec-2020

GENERAL COMMENTS	<p>I appreciate the opportunity to review for the BMJ Open.</p> <p>Objective: it is not oral health, but the objective is about dental caries;</p> <p>Methodology: needs to be better detailed: example: questionnaire, sample calculation (prevalence, error, level of significance);</p> <p>Methodology: why choose > 6 months? What is the reference for using this parameter?</p> <p>Reproducibility for the exam is poorly detailed. Fundamental to an article with this objective;</p> <p>Results: Tables 2 and 3 are repeated;</p> <p>Results: regression, the most important part, is not explained;</p> <p>Discussion: repetition of results and not the discussion of results;</p> <p>Statistical analysis: in table 6 it is not Wals (correct: Wald);</p> <p>Statistical analysis: organize. Suggestion: The study's outcome variable was xxxxxxxxxxxxxxxxxxxxxxxx, dichotomized as xxxxxxxxxxxx. The independent variables were classified xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx. Simple and multiple logistic regression models analyzed the associations between the outcomes and the independent variables after the descriptive analysis of the data. The quality of the adjustments was assessed by the Akaike information criterion (AIC) and -2 Log L, based on the significance level of 5%.</p>
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REVIEWER	Alkhtib, Asmaa The University of Melbourne Melbourne Dental School
REVIEW RETURNED	16-Feb-2021

GENERAL COMMENTS	<p>In page 8 line 33 what does Closure rate mean? is it Fissure Sealant? need to clarify</p> <p>in Page 8 line 43-47 need to provide numbers or refer to a table for the reader.</p>
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REVIEWER	Veerasamy, Arthi University of Otago Faculty of Dentistry, Oral rehabilitation
REVIEW RETURNED	24-Jul-2021

GENERAL COMMENTS	This is a well designed study. The study results will provide valuable information for the local governemnet and policy makers. The oral health survey part of the study does not have any much concerns. However, the questionnaire part of the study needs more clarification with respect to methodology, items/questionnaire details, etc. More details on staitistical tests selection is needed. The reporting of results in the table needs further information for readers to understand the quality of tests performed. However, by improving the manuscript by addressing the concerns raised in the attached pdf (contact publisher for this file) would make this paper publishable. Thanks for the oppourtunity to review this paper.
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VERSION 1 – AUTHOR RESPONSE

Reviewer: 1

Dr. Marcelo Meneghim, Pontificia Universidade Catolica de Campinas

Comments to the Author:

I appreciate the opportunity to review for the BMJ Open.

Objective: it is not oral health, but the objective is about dental caries;

Response: We really appreciate your suggestion. We have rewritten the objective section on Page 3, Line 9.

“Objectives The present study investigated the prevalence and factors contributing to dental caries in 12-15-year-old children in northeast China to provide information for dental caries promotion programmes.”

Methodology: needs to be better detailed: example: questionnaire, sample calculation (prevalence, error, level of significance);

Response: We really appreciate your suggestion. The sample size was calculated based on the data of the 3rd National Oral Health Survey in 2005, in which the prevalence of dental caries for those aged 12 years was 28.9% .The design effect (def=4.5), significance level ($\alpha=5\%$), margin of error ($\delta=10\%$) and non-response rate (20%) were also included in the following formula:

$$n = deff \frac{u_{\alpha} / 2^2}{\delta^2} p(1 - p)$$

Based on this estimation, the required sample size for 12-15-year-old in this study was at least 3660. We have added the related the detailed calculation on Page6, Line 45 to 60.

Reference:

1.Cao CF. Prevalences of periodontal diseases and dental caries in China: re-analysis of the data from the Third National Epidemiological Survey on Oral Health. Zhonghua KouQiang Yi Xue Za Zhi 2013; 48(5): 257-259.

2.Lu HX, Tao DY, Lo ECM, et al. The 4th national oral health survey in the mainland of China: background and methodology. Chin J Dent Res. 2018;21(3):161–165.

Methodology: why choose > 6 months? What is the reference for using this parameter?

Response: Thanks for your question. According to the “Interim Regulations on residence permits” in China, which stipulated that residents can apply for a local residence permit only after they have lived in the local area for more than 6 months. Therefore, considering that the floating population cannot represent the oral health level of the local population, this survey select participants resided in the survey area for > 6 months. At the same time, the relevant literature is also selected for 6 months.

Reference:

1. Gao X, Ding M, Xu M, et al. Utilization of dental services and associated factors among preschool children in China. BMC Oral Health. 2020;20(1):9.
2. Yin W, Yang YM, Chen H, et al. Oral health status in Sichuan Province: findings from the oral health survey of Sichuan, 2015-2016. Int J Oral Sci. 2017;9(1):10-15.

Reproducibility for the exam is poorly detailed. Fundamental to an article with this objective;

Response: We appreciate this question. We are sorry to make you confused about the description of this section. We have added this part more detailed in methods on Page7 , Line20-40.

“The three examiners were trained in theoretical and clinical knowledge by a standard examiner (the fourth examiner) before the survey. Duplicate examinations were randomly conducted in 5% of the participants to compare the findings. Moreover, the standard examiner reviewed the data for five of the participants who were assessed by each of the other inspectors. All of the review results were used to calculate a Kappa value. The mean Kappa values used to determine interexaminer reproducibility were 0.85 for the dental caries exam. Then, the qualified dentists performed the oral examinations at health service classroom in local school.”

Results: Tables 2 and 3 are repeated;

Response: Thanks for your question and we are sorry to make this fault. We have replaced Table2 in the revised manuscript.

Table2 The prevalence of dental caries, rate of pit and fissure sealant and mean value of DMFT with different districts and genders

Group		N	Pit and fissure sealant (%)	DT	MT	FT	DMFT			Caries Frequency		
							X±SD	t / F	P value	Percentage (%)	Chi-square	P value
Area	Urban	1,841	22	0.54±1.17*	0.01	0.64±1.42*	1.19±1.87*	-11.67	< 0.001	45.68*	92.36	< 0.001
	Rural	1,890	9	1.62±2.41	0.01	0.45±1.24	2.08±2.73			61.37		
Age	12	769	19	0.84±1.55*	0.01	0.48±1.12*	1.33±1.90	7.147		51.23		
	13	1,082	18	1.18±2.16	0.01	0.46±1.43	1.64±2.42		< 0.001	52.03		
	14	950	13	1.04±1.92	0.01	0.64±1.58	1.69±2.47			54.52	6.398	> 0.05
	15	930	13	1.23±2.09	0.01	0.61±1.43	1.85±2.57			56.55		
Gender	Male	1,859	13	0.90±1.74*	0.01	0.39±1.01*	1.29±2.02*	-9.12	< 0.001	47.87*	49.37	< 0.001
	Female	1,872	18	1.28±2.17	0.01	0.71±1.58	1.99±2.65			59.34		
Total		3,731	16	1.09±1.97	0.01	0.55±1.34	1.64±2.38			53.63		

Results: regression, the most important part, is not explained;

Response: We appreciate this question. We have explained the regression in results on Page 11, Line14-50.

“To identify factors affecting dental caries, we analysed the data collected using the questionnaire, including age, gender, parents’ education, oral health-related habits and behaviours and knowledge of oral health). For the binary logistic regression analysis, a score of “0” was assigned to children without dental caries, and a score of “1” was assigned for children with dental caries. A score of “1” was assigned to male children, a score of “0” was assigned to female children. A score of “1” was assigned to father’s low education level, a score of “2” was assigned to father’s medium education level and a score of “3” was assigned to father’s high education level. A score of “1” was assigned to urban, a score of “2” was assigned to rural. As shown in Table 6, the results of the binary logistic analysis showed that age, regional, gender and father’ education factors contributed to the caries experience (caries prevalence) of the studied children ($P < 0.05$). The prevalence of dental caries was 1.653 times higher in female children than in male children, 95% CI: (1.449, 1.885). The risk of dental caries increased by 1.068 times as the age increased by one year, 95% CI: (1.001, 1.139). The prevalence of dental caries was affected by father’s education level. The prevalence of dental caries in the offspring of highly educated fathers decreased to 0.788 times, 95% CI:(0.658, 0.944). And the risk of dental caries in urban children was 1.774 times higher than that in rural children, 95% CI: (1.534, 2.052). ”

Discussion: repetition of results and not the discussion of results;

Response: We appreciate this question. We discussed more detailed in the discussion on Page12 , 13.

Statistical analysis: in table 6 it is not Wals (correct: Wald);

Response: We appreciate this question. we are sorry to make this fault and we have corrected this word in Table 6.

Statistical analysis: organize. Suggestion: The study's outcome variable was xxxxxxxxxxxxxxxxxxxxxxxx, dichotomized as xxxxxxxxxx. The independent variables were classified xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx. Simple and multiple logistic regression models analyzed the associations between the outcomes and the independent variables after the descriptive analysis of the data. The quality of the adjustments was assessed by the Akaike information criterion (AIC) and -2 Log L, based on the significance level of 5%.

Response: We appreciate this question. We learned that the quality of the adjustments was assessed by the Akaike information criterion (AIC) and -2 Log L, based on the significance level of 5%. However, Kappa value is used to determine the interexaminer reproducibility in China. The specific methods are as follows, the three examiners were trained in theoretical and clinical knowledge by a standard examiner (the fourth examiner) before the survey. Duplicate examinations were randomly conducted in 5% of the participants to compare the findings. Moreover, the standard examiner reviewed the data for five of the participants who were assessed by each of the other inspectors. All of the review results were used to calculate a Kappa value. The mean Kappa values used to determine interexaminer reproducibility were 0.85 for the dental caries exam.

Reference:

1.Lu HX, Tao DY, Lo ECM, et al. The 4th national oral health survey in the mainland of China: background and methodology. Chin J Dent Res. 2018;21(3):161–165.

2.Meng Zhang, Jing Lan, Tiantian Zhang, et al. Oral health and caries/gingivitis-associated factors of adolescents aged 12–15 in Shandong province, China: a cross-sectional Oral Health Survey. BMC Oral Health. 2021;21: 288.

3.Lingxia Guan, Jing Guo, Jinghao Ban et al. Status of dental caries and associated factors in Tibetan adults: findings from the fourth China National Oral Health Survey. BMC Oral Health. 2020;20: 248.

Reviewer: 2

Dr. Asmaa Alkhtib, The University of Melbourne Melbourne Dental School, Primary Health Corporation

Comments to the Author:

In page 8 line 33 what does Closure rate mean? is it Fissure Sealant? need to clarify

Response: We appreciate this question. we are sorry to make you confused and and we have corrected this sentence on Page 9, Line 24.

“The pit and fissure sealant rate was 16%. ”

in Page 8 line 43-47 need to provide numbers or refer to a table for the reader.

Response: We appreciate this question. We have referred Table 2 in this part for the reader on Page 9, Line 29-35.

“The prevalence of dental caries and DMFT values were higher in female children (59.34%, 1.99±2.65) than male children (47.87%, 1.29±2.02) and higher in rural areas (61.37%, 2.08±2.73) than urban (45.68%, 1.19±1.87) (Table 2). ”

Reviewer: 3

Dr. Arthi Veerasamy, Univ Canterbury

Comments to the Author:

This is a well designed study. The study results will provide valuable information for the local government and policy makers. The oral health survey part of the study does not have any much concerns. However, the questionnaire part of the study needs more clarification with respect to methodology, items/questionnaire details, etc. More details on statistical tests selection is needed. The reporting of results in the table needs further information for readers to understand the quality of tests performed. However, by improving the manuscript by addressing the concerns raised in the attached pdf would make this paper publishable. Thanks for the opportunity to review this paper.

Please mention when was the last survey in this province.

Response: We appreciate this question. According to the datum, the last survey in Liaoning province of 12-15-year-old school children was in 2005. However, there are no related reports in the past decade. We have rewritten on Page 5, Line 31-35.

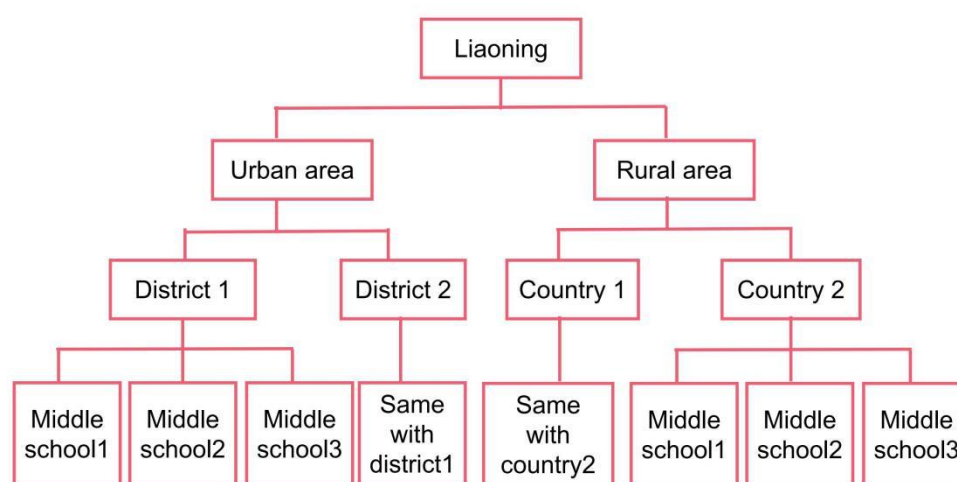
Reference:

Qi XQ. The third National Oral Health Epidemiological Survey in China. Beijing: People's Medical Publishing House; 2008.

Please make it more clear. sampling procedure can be provided as flow chart or describe clearly.

Response: We appreciate this question. We are so sorry to make you confused. We have described this part in sample selection on Page 6, Line 19-38.

“In the first stage of sampling, districts and counties were considered as strata, and population data were obtained from the 2010 census conducted by National Bureau of Statistics of the People's Republic of China. Two counties and two districts were randomly selected from each stratum using the probability-proportional-to-size (PPS). Finally, four areas (Shenyang, Heping District, Jinzhou Linghe District, Donggang county and Zhuanghe county). In the second stage, three middle schools were randomly selected from each district (county). In the third stage, cluster sampling method was used to randomly select students aged 12, 13, 14 and 15 from each middle school.”



why 6 months? please add basis for this selection.

Response: Thanks for your question. According to the “Interim Regulations on residence permits” in China, which stipulated that residents can apply for a local residence permit only after they have lived in the local area for more than 6 months. Therefore, considering that the floating population cannot

represent the oral health level of the local population, this survey select participants resided in the survey area for > 6 months. At the same time, the relevant literature is also selected for 6 months.

Reference:

1. Gao X, Ding M, Xu M, et al. Utilization of dental services and associated factors among preschool children in China. *BMC Oral Health*. 2020;20(1):9.
2. Yin W, Yang YM, Chen H, et al. Oral health status in Sichuan Province: findings from the oral health survey of Sichuan, 2015-2016. *Int J Oral Sci*. 2017;9(1):10-15.

How they approached. Door by door? Why not schools? which is a common practice? Please provided the procedure clearly. who did the data collection. How consent forms distributed. How information provided. Written or verbal?

Response: We appreciate this question. We are so sorry to make you confused. We have described this part more detailed in questionnaire on Page 7, Line 45-57.

“Three questionnaire interviewers have underwent the screening, training and certification by the nation. And they were arranged to collect the questionnaire information as efficiently and unbiasedly as possible. The coincidence rate of the questionnaire answers between each interviewers and trainer must exceed 95%. Then the questionnaire interviewers went to the school classroom and explained the purpose and matters needing attention to the students. The questionnaire were completed by the student independently.”

How many dentists? How they are trained to do this oral examination. How inter examiner reliability measured?

Response: We appreciate this question. We have described this part more detailed in caries examination on Page 7, Line 20-35.

“ The three examiners were trained in theoretical and clinical knowledge by a standard examiner (the fourth examiner) before the survey. Duplicate examinations were randomly conducted in 5% of the participants to compare the findings. Moreover, the standard examiner reviewed the data for five of the participants who were assessed by each of the other inspectors. All of the review results were used to calculate a Kappa value. The mean Kappa values used to determine interexaminer reproducibility were 0.85 for the dental caries exam. Then, the qualified dentists performed the oral examinations at health service classroom in local school.”

Where?

Response: We appreciate this question. We have added the oral examination place in the part of dental caries on Page 7, Line 33-35.

“The qualified dentists performed the oral examinations at health service classroom in local school.”

Line 38 should come here. Both together would make sense. Thank you.

Response: We appreciate this question. We have rewritten the caries examination.

“ The three examiners were trained in theoretical and clinical knowledge by a standard examiner (the fourth examiner) before the survey. Duplicate examinations were randomly conducted in 5% of the participants to compare the findings. Moreover, the standard examiner reviewed the data for five of the participants who were assessed by each of the other inspectors. All of the review results were

used to calculate a Kappa value. The mean Kappa values used to determine interexaminer reproducibility were 0.85 for the dental caries exam. Then, the qualified dentists performed the oral examinations at health service classroom in local school."

Is it developed by the authors? Was it pilot tested or content validated?

Response: We appreciate this question. The questionnaire survey was referenced by 4th National Oral Health Survey.

Reference:

1.Lu HX, Tao DY, Lo ECM, et al. The 4th National Oral Health Survey in the Mainland of China: Background and Methodology. Chin J Dent Res. 2018;21(3):161-165.

2.Lingxia Guan, Jing Guo, Jinghao Ban et al. Status of dental caries and associated factors in Tibetan adults: findings from the fourth China National Oral Health Survey. BMC Oral Health. 2020;20:248.

This sentence need to be in the methods section. Would answer many of my comments. Thank you.

Response: We appreciate this question. The selection and distribution of cities were introduced in the methods section on Page 6, Line 17-36.

"This study was performed in Liaoning province, and multi-stage stratified sampling was used in this study. In the first stage of sampling, districts and counties were considered as strata, and population data were obtained from the 2010 census conducted by National Bureau of Statistics of the People's Republic of China. Two rural counties and two urban districts were randomly selected from each stratum using the probability-proportional-to-size (PPS). Finally, four areas (Shenyang, Heping District, Jinzhou Linghe District, Donggang county and Zhuanghe county). In the second stage, three middle schools were randomly selected from each district (county). In the third stage, cluster sampling method was used to randomly select students aged 12, 13, 14 and 15 from each middle school."

Is this question asked to participants? Aren't they too young for this question? Please add reasons for why this question was added.

Response: We appreciate this question. The questionnaire survey was referenced by 4th National Oral Health Survey. In China, there are relevant oral health courses in primary school aged 6-12 and secondary school aged 12-15. For the 12 to 15-year-old age group, a self-completed questionnaire was designed to collect the data of the participants' sociodemographic background, attitude to oral health, knowledge and behaviours. Teachers and interviewers co-organised and illustrated the content of the questionnaire, before the participants completed all questions by themselves in the classroom.

Reference:

1. Lu HX, Tao DY, Lo ECM, et al. The 4th National Oral Health Survey in the Mainland of China: Background and Methodology. Chin J Dent Res. 2018;21(3):161-165.

2.Yin W, Yang YM, Chen H, et al. Oral health status in Sichuan Province: findings from the oral health survey of Sichuan, 2015-2016. Int J Oral Sci. 2017;9(1):10-15.

Other questions on WHO attitude questions added? Please state basis for adding these questions.

Response: We appreciate this question. The questionnaire survey was referenced by 4th National Oral Health Survey. There were four question about the oral health attitudes including "Oral health is important to life", "Regular oral examination is necessary", "Teeth are born good or bad, no correlation with the protection", "We should rely mainly on ourselves to prevent oral diseases".

Reference:

Lu HX, Tao DY, Lo ECM, et al. The 4th National Oral Health Survey in the Mainland of China: Background and Methodology. Chin J Dent Res. 2018;21(3):161-165.

Please redraft paper based on effect size rather than p value. Rather than using statistically significant difference please use terms such as weak evidence, strong evidence moderate evidence.

Response: We appreciate this question. In this study, we use the OR value and 95% confidence interval to reflect the practical significance.

More details required to know how this was performed. the variables used etc

DMFT can be used as continuous variable and multiple variable regression analysis. With binary logistic regression as we are dichotomization makes us lose valuable information.

Response: We appreciate this question. In this study, there are a few children whose DMFT were above 2, therefore, we classify children with DMFT greater than or equal to 1 as dental caries uniformly and the classification of DMFT in the final statistical data is a binary variable. A score of "0" was assigned to children without dental caries, and a score of "1" was assigned for children with dental caries. Binary variable logistic regression was used in the study.

With a very good sample size multiple variable regression would have been a good choice. At least provide justification why this was decided.

Response: We appreciate this question. During the data analysis, we found that there are a few children whose DMFT were above 2, therefore, we classify children with DMFT greater than or equal to 1 as dental caries uniformly and the classification of DMFT in the final statistical data is a binary variable.

Nigerian study referenced. Other two Indian studies are not recent. There are major studies done in these areas. Please change it to, Tamil Nadu, India. Tamil Nadu is the a state in India.

Response: We appreciate this question. We have added recent references about changed this sentence into "This prevalence rate is higher India in 2017 (the prevalence of dental caries is 47.2%) ;Malawi in 2016 (the prevalence of caries were 19.1%, 21.9% in 12 year-olds, 15 year-olds respectively); while similar to the results in Brazil in 2021 "

Reference :

1.Kumar S, Kumar A, Badiyani B, Kumar A, Basak D, Ismail MB. Oral health impact, dental caries experience, and associated factors in 12-15-year-old school children in India. Int J Adolesc Med Health. 2017;29(2):

2.Msyamboza KP, Phale E, Namalika JM, et al. Magnitude of dental caries, missing and filled teeth in Malawi: National Oral Health Survey. BMC Oral Health. 2016;16:29.

3.Arantes R, Jamieson LM, Frazão P. Dental caries, periodontal disease and restorative dental care among Indigenous and non-Indigenous groups in Brazil: A descriptive study. Community Dent Oral Epidemiol. 2021;49(1):63-69.

This sentence with 15, 16 reference can be removed. Sentence in line 8 can be rewritten to comment only about bad eating habits. Big assumption to claim the overweight, because it was not measured in this study.

Response: We appreciate this question. We have rewritten this sentence into “ Researches reported that adolescents were more prone to have bad eating habits, which may be correlated with the prevalence of dental caries. ”

Please add the oral health service differences between rural and urban areas in the province. This will help readers why rural area need more service or if there was any confounding factors for this difference.

Response: We appreciate this question. We have added the confounding factors on Page15, Line48- Page16, Line8.

“It is concluded that the epidemic characteristics have changed. Several factors, such as the dynamic development of differences in dietary habits, economic levels and access to oral medical resources of urban and rural residents might have led to changes in caries prevalence and improved awareness in urban and rural areas .However, the awareness of children’s parents should be evaluated more because of the high caries prevalence. And the government should concerns that dental medical resources, service level and residents' awareness of oral health care in suburban areas are relatively lagging, resulting in the difference of dental caries between urban and rural areas. “

Evidence. Was there a past study measured these variables? Please add results of that study and cite. Thank you.

Response: We appreciate this question. We have cited the references in the revised paper on Page 13, Line 10-12 .

“ The questionnaires found that oral health awareness and attitude improved significantly in the past decade, especially in rural areas.”

Reference:

Quan JK, Wang XZ, Sun XY, et al. Permanent Teeth Caries Status of 12- to 15-year-olds in China: Findings from the 4th National Oral Health Survey. Chin J Dent Res. 2018;21(3):181-193.

First time mentioned. In the introduction it was mentioned 2025 goal.

Response: We appreciate this question. We are so sorry to make this fault. We have corrected it in introduction on Page 5, Line43-50.

“The goal of caries prevention is to reduce the prevalence of caries in 12-year-old children to under 30% by 2030 in mid- and long-term plans for prevention and treatment of chronic diseases issued by the General Office of the State Council of China”

VERSION 2 – REVIEW

REVIEWER	Veerasamy, Arthi University of Otago Faculty of Dentistry, Oral rehabilitation
REVIEW RETURNED	06-Sep-2021
GENERAL COMMENTS	The study is more valuable study for the developing countries to prevent dental caries in young population. This is well designed study and the results will inform policy makers for policy decisions to improve oral health outcome of their population. The paper needs some minor changes as suggested in the attached pdf document – contact publisher for this file.

VERSION 2 – AUTHOR’S RESPONSE

Reviewer: 3

Dr. Arthi Veerasamy, University of Otago Faculty of Dentistry

Comments to the Author:

The study is more valuable study for the developing countries to prevent dental caries in young population. This is well designed study and the results will inform policy makers for policy decisions to improve oral health outcome of their population.

The paper needs some minor changes as suggested in the attached pdf document.

If journal guidelines do not recommend Strength/limitations in the start, I suggest moving this to discussion section just before conclusion.

This sentence needs grammar correction.

I think both limitations are not satisfactory. Please add what authors mean by more important information.

Response: Thanks for your question. According to the journal guidance, which requires “an article summary, placed after the abstract, consisting of the heading ‘Strengths and limitations of this study’, and containing up to five short bullet points, no longer than one sentence each.”, I have rewritten the strengths and limitations of this study on Page 3, Line 53-Page 4, Line 12.

“(1) This survey is with a good sample size and wide coverage.

(2) These results would provide valuable information for the local government and policy makers.

(3) There are no related reports in the past decade in Liaoning province in China.

(4) Family income was not included in the questionnaire, therefore, it is difficult to infer the relationship between socioeconomic factor and dental caries.”

Please add a data on what WHO's report on adolescents' prevalence. then there will be continuity when authors discuss about puberty.

Response: We appreciate this question. We are so sorry to make you confused. We have described this part on Page 4, Line 20-26.

“ A World Health Organization (WHO) analysis reported that oral disease has become a determining factor for quality of life and a global burden on social and economic health, affecting 2.4 billion people, 621 million adolescents worldwide. The global average DMFT in 12-year-old adolescent is 1.86.”

Reference:

1.Martins MT, Sardenberg F, Bendo CB et al. Dental caries remains as the main oral condition with the greatest impact on children's quality of life. PLoS One 2017; 12:e0185365.

2.Kassebaum NJ, Bernabé E, Dahiya M, Bhandari B, Murray CJ, Marcenes W. Global burden of untreated caries: a systematic review and metaregression. J Dent Res. 2015; 94(5):650–658.

Change in diets habits due to changing lifestyle can be added here.

Response: Thanks for your question.We have described this part on Page 4, Line 44-50.

“China is one of the largest developing countries in the world, and it has accomplished great achievements in economic development during the past decades. With the improvement of residents' living standards, daily habits and lifestyles have also changed.”

The authors mentioned in the beginning of the paper. It didn't make sense there. May be shifting strength and limitation to end of the paper would be helpful. Otherwise, rewrite both strength and limitation section to suit for the current position.

Response: We appreciate this question. We are so sorry to make you confused. We have deleted the explanation of kappa value at the strength and limitation. We elaborated on this issue in this part.

Please add completion rate also.

We need some statement here to justify the students were not forced to participate or complete. They were given choice to participate or not. Verbal consent achieved (or not) etc. When authors say 100%, which is unusual in the most studies. Please write here how all ethical procedures followed. Thank you.

Response: Thanks for your question. We have add completion rate on Page 9, Line 29. The questionnaire survey and oral examination were conducted on the same day. The questionnaire interviewers checked the questionnaire to avoid the lack of information before the children left, so the questionnaire response rate and completion rate could reach 100%. In the selected middle school, children's information (name,gender, date of birth) would be registered. For students who met the requirements, an informed consent would be issued and signed by their parents. For students who agree to the examination, the worker would make an appointment for oral examination and questionnaire survey in school.

“ The response rate of questions and completion rate were 100%.”

Please write, About 89.76% of participants brushed their teeth....

Pls remove according to questionnaire

Response: We appreciate this question. We have rewritten this part on Page 9, Line 43-45.

“According to the questionnaire (Table 4), about 89.76% of participants brushed their teeth(Figure 3a), and 19.9% of the studied adolescents used fluoride toothpaste.”

I understand culturally we tend to use the term "children" for 12-15 years. However, it is more appropriate to use the term "adolescent" for international audience.

Response: Thanks for your question. We have replace all “children” to “adolescents”.

Cost an issue in the surveyed region? If not mention even though service is provided for free, they tend to ignore. Although socioeconomic factor is determinant of oral health there are various reasons for that Not just cost.

Response: We appreciate this question. We have rewritten this part on Page 12, Line 25-32.

“We considered that father's education level would influence the family living condition, family environment and attention to adolescents' oral health that greatly affected the prevalence of dental caries.”

Please remove questionnaire word. It sounds like questionnaire found the answer. The survey results, the current study, etc can be used instead.

Response: Thanks for your question. We have rewritten this part on Page 11, Line 44-46.

“The survey results found that oral health awareness and attitude improved significantly in the past decade, especially in rural areas.”

Please add percentage in brackets.

Response: We appreciate this question. We have add this part on Page 19(Table1).

Table1.The distributions and numbers of the studied adolescents in Liaoning Province

Area	City	Numbers			
		of school selected	Male	Female	Total
Urban	Shenyang	3	436 (11.68%)	452 (12.11%)	1,841
	Jinzhou	3	473 (12.68%)	480 (12.87%)	(49.34%)
Rural	Donggang	3	469 (12.57%)	466 (12.49%)	1,890
	Zhuanghe	3	481 (12.89%)	471 (12.62%)	(50.66%)
Total		12	1,859 (49.82%)	1,872 (50.17%)	3,731

Please add effect size for the results. writing the paper with just p value is not accepted in the current research community. Adding effect size would increase the value of this paper three fold.

Response: Thanks for your question. We have add this part on Page 20(Table2), Page 23-24(Table5).

Table2 The prevalence of dental caries, rate of pit and fissure sealant and mean value of DMFT with different districts and genders

Group		N	Pit and fissure sealant (%)	DT	MT	FT	DMFT				Caries Frequency			
							X±SD	t / F	P value	Effect Size	Percentage (%)	Chi-square	P value	Effect Size
Area	Urban	1,841	22	0.54±1.17*	0.01	0.64±1.42*	1.19±1.87*	-11.67	<0.001	0.187	45.68*	92.36	<0.001	0.161
	Rural	1,890	9	1.62±2.41	0.01	0.45±1.24	2.08±2.73				61.37			
Age	12	769	19	0.84±1.55*	0.01	0.48±1.12*	1.33±1.90	4.295	<0.05	0.001	51.23	6.398	>0.05	0.044
	13	1,082	18	1.18±2.16	0.01	0.46±1.43	1.64±2.42				52.03			
	14	950	13	1.04±1.92	0.01	0.64±1.58	1.69±2.47				54.52			
	15	930	13	1.23±2.09	0.01	0.61±1.43	1.85±2.57				56.55			
Gender	Male	1,859	13	0.90±1.74*	0.01	0.39±1.01*	1.29±2.02*	-9.12	<0.001	0.147	47.87*	49.37	<0.001	0.118
	Female	1,872	18	1.28±2.17	0.01	0.71±1.58	1.99±2.65				59.34			
Total		3,731	16	1.09±1.97	0.01	0.55±1.34	1.64±2.38				53.63			

Table5. The percentage of response on questions of oral health knowledges and attitudes

	Liaoning Province			Urban			Rrual			X ²	p value	Effect Size
	Agree N(%)	Disagree N(%)	Unknown N(%)	Agree N(%)	Disagree N(%)	Unknown N(%)	Agree N(%)	Disagree N(%)	Unknown n N(%)			
Oral health awareness												
1. Gum bleeding is normal when brushing your teeth	551(14.80)	2635(70.51)	545(14.69)	212(11.51)	1372(74.52)	257(13.95)	339(17.95)	1263(66.82)	288(15.23)	34.91	< 0.001	0.097
2. Bacteria are one of the causes of inflammation of the gums	2841(76.13)	234(6.30)	656(17.57)	1423(77.29)	110(5.97)	308(16.73)	1418(75.02)	124(6.56)	348(18.41)	2.642	0.267	0.027
3. Cleaning your teeth is not useful for preventing inflammation of the gums	288(7.74)	2830(75.92)	613(16.34)	144(7.82)	1405(76.31)	292(15.86)	144(7.61)	1425(75.39)	321(16.40)	0.87	0.647	0.015
4. Dental caries are caused by bacteria on teeth	2278(61.10)	384(10.34)	1069(28.57)	1206(68.44)	180(9.8)	455(24.71)	1072(58.22)	204(11.08)	614(33.35)	32.39	< 0.001	0.093
5. Sweets can lead to dental caries	2798(75.12)	299(8.30)	634(16.58)	1449(78.70)	140(7.60)	252(13.69)	1349(73.75)	159(8.41)	382(20.21)	30.80	< 0.001	0.091
6. Fluoride is useless to dental protection	204(5.55)	1853(49.72)	1674(44.73)	99(5.37)	951(51.65)	791(42.96)	105(5.55)	902(47.72)	883(46.71)	5.886	0.053	0.04
7. Pit and fissure sealant can prevent dental caries of adolescents	1558(41.82)	479(12.81)	1694(45.37)	967(52.52)	185(10.04)	689(37.42)	591(31.26)	294(15.55)	1005(53.17)	173.87	< 0.001	0.216
8. Oral diseases can cause or exacerbate certain systemic diseases	2219(59.54)	431(11.45)	1081(29.01)	1088(59.09)	213(11.57)	540(29.33)	1131(59.84)	218(11.50)	541(28.62)	0.249	0.883	0.008
Oral health attitudes												
1. Oral health is important to life	3473(93.18)	30(0.71)	228(6.11)	1699(92.28)	130(7.1)	129(7.01)	1774(93.8)	17(0.89)	99(5.23)	5.68	0.128	0.039
2. Regular oral examination is necessary	2829(75.81)	82(2.28)	820(21.92)	1383(75.12)	37(1.68)	421(22.87)	1446(76.5)	45(2.38)	399(22.27)	2.24	0.524	0.024
3. Teeth are born good or bad, no correlation with the protection	186(5.04)	3333(89.32)	212(5.64)	92(4.99)	1629(88.48)	120(6.51)	94(4.97)	1704(90.15)	92(4.86)	4.804	0.187	0.036
4. We should rely mainly on ourselves to prevent oral diseases	3448(92.41)	84(2.35)	199(5.24)	1695(92.06)	36(1.95)	110(5.97)	1753(92.7)	48(2.53)	89(4.71)	4.441	0.218	0.034