PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	Socioeconomic inequalities in caries experience, care level and dental attendance in primary school children in Belgium: a cross-sectional survey
AUTHORS	Lambert, Martijn; Vanobbergen, Jacques; Martens, Luc; De Visschere, Luc

VERSION 1 - REVIEW

REVIEWER	Chun CHANG Peking UNiversity Health Science Center Beijing, China
REVIEW RETURNED	21-Feb-2017

| GENERAL COMMENTS | 1. Sampling process
In the part of abstract, mothods and discussion, the auther mentioned that the respondents were selected randomly.
Q1. Totally 2216 children were investigated in 105 schools. It is suggested to present how to estimate the sample size.
Q2. How to selecte 105 schools within all 2340 schools? Whether the distribution of "15% GO, 15% OGO, 70% VGO" was showed in the 105 schools? and How many special schools in the samplized schools? It is necessary to explain whether the 105 schools could represent all the 2340 schools.

2. Questionnaire pretest
Q1. How many children were measured in the pretest? and how to recruit them?
Q2. What indicators were applied to present discriminatory power and reliability? what analysis methods were used to analyze the indicators? and in
"A higher score out of ten correlates to more knowledge and a better attitude. ", the score is?

3. uncomplete records and missing data
Q1. It is suggested to show the proportion of children eligible for the "Maximum Bill" in both responders and non-responderspresent in results.
Q2. to compare the social status indicators in two group, normally t-test or cross table was used, but not correlation analysis. In page 9, " there was no relationship between…" may cause misunderstanding.

4. First paragraph in Page 13
"basic dental costs are completely reimbursed in Belgium for all children under the age of 18, so in fact differences in utilization of health care services for
financial reasons are not expected. However, in most dental |

	practices, the often high dental fee needs to be paid first by the client, to get it reimbursed by the health insurance agencyafterwards. " It seems that the author concerned financial factor still the main reason for lower rate of oral health service utilization for the underprivileged children. While, it may need to concern also that the parents of low social class took less awareness of the imporatance of their children's oral health but not financial reason.

REVIEWER	Ben Balevi University of British Columbia , Canada
REVIEW RETURNED	02-Apr-2017

GENERAL COMMENTS	Peer Review – BMJ-Open Socioeconomic inequalities in oral health aspects in primary school children: a cross-sectional servey Lambert, M et al Peer Reviewer Dr. Ben Balevi Date March 31st, 2017 Summary of My understanding The clinical question this study is trying to answer is ; Question Is there an association between the SES of primary school children and oral health, oral health behavior and dental compliance ? Methodology : cross sectional studies of primary school children in Belgium. Children were identified as either underprivileged (i.e., or from low income familes who make use of the "Maximum Bill") and fortunate (i.e., middle or high income families who do not make use of the Maximum Bill") Outcome 1. Oral Health a. DMFt, DMFs, (where D was classified as either D1 or D3 based on ICDAS) , b. Restorative Index (RI) , Treatment Index(TI), Care Index(CI) c. % Caries Free d. Plaque Index 2. Oral health behavior a. " validated and reliable questionnaire" 3. Dental Compliance a. Restorative Index (RI) , Treatment Index(TI), Care Index(CI) b. dichotomized between children with (<100%) and without untreated caries(=100%) c. Regular Attender d. No Dental Visits between 2009-2013 The main conclusion is A statistical significant difference between "underprivileged" and "fortunate" children on all Oral health, Oral health behavior and dental compliance outcomes

My concerns that need further explanation

1. There are some minor grammatical inconsistency through out the paper . I have tried to identify a few of them. Also parts of the paper may benefit from some stylistic changes in order to improve its clarity .

2. ABSTACT – (page 3, line 44-52) I prefer that results be given with their associated 95%Confidence Interval (95%CI). For example; 78.4% (??95%CI) , 88.4% (??95%CI)and 12.6% (??95%CI) Also only one of the Oral health outcomes (%Caries Free) and one Dental compliance outcome (dental attenders) are given. Yet the conclusion (page 3, Line 54-58) States " … Oral hygiene, oral health care … are strongly negative affected… " without giving any results for these outcomes in the abstract's results section.

3. Strengths and Limitations (page 4 line 15) Not "All aspects of oral health … behavior" are considered as outcomes such as gingival index and frequency of brushing are not considered. I would suggest changing "ALL" to " Many" or " A number of "

4. Page 6 Line 5 – I think the word "yet" at the end of the sentence should be omitted.

5. Page 6 line 23 – replace " took" with "take" (i.e.,… dentist partially or completely TOOK part in this convention)

6. P. 8 Line 16 – replace "are" with "were" (i.e., " … lesion restricted to the enamel WERE taken into account)

7. P8 Lines 18-28. This section must better define the variables in the equations. For example. RI = Ft/D3Ft. what does Ft mean? (Filled teeth?) what does D3Ft mean? (the sum of all unrestored D3 and Ft ? if so then the formula should be D3+Ft). The same is true with the care index and treatment index formula; define all variable in the equation. ALSO, is it possible to give some reference of where you got these indices, where have they been validated and where else these indices were used in the literature?

8. P8 lines 57 – replace "profit" with "part" (i.e, "… those who cannot take PART of this system)

9. METHODS SECTION - not clear if the investigators where blinded to the SES of the children they examined

10. RESULTS SECTION … I like 95%CI associated with all outcomes in result section as well as in the Tables 1 &2 (pages 19 - 20, also see comment 2 above). Although SD are given in Table 1, 95%CI reflect on the precision of the estimated (mean) as well as the magnitude and direction of the difference, thus making them more applicable to clinical decision making.

11. P10 Line 33-33 " mean age of 11.25 years (+-0.68)". I am not sure if the 0.68 is the SD or 95%CI

12. P. 10 line 33 … replace " could be" with "was" AND " Uncomplete " with "Incomplete" AND "are" with "were" (i.e., Data analysis WAS performed in 88.2% (n=1954) . INCOMPLETE records WERE …")

13. P. 11 line 7-8 replace "was" with "were" (i.e., …78.4% (95%CI if possible :)) of the low- income children WERE caries free…)

14. P.12 Line 50-51 . How about adding "arithmetic " between 10% and "gap" (i.e., A 10% ARTHMETIC gap emerges…". This avoids confusing the absolute difference of CI, TI and RI between the two groups with relative difference between the two groups. Just a stylistic suggestion.

15. P.13 lines 12-20. This part of the discussion brings out some great points regarding the barrier of out of pocket cost to the "underprivileged" cohort. I am not sure exactly how the "Maximum Bill " works , but if it still requires the family to pay "out of pocket" the difference before they can collect it back from the government program, then it would require the family to have the money which they may not have in the first place. Such a barrier adds to the "access to care" problem and possibly another reason why the low income cohort show poorer "dental compliance" outcomes

16. DISCUSSION – should also reflect on the strength and limitations of the study. Although the authors include these reflections on page 4, I am use to seeing them in the discussion section.

17. P. 14 line 16… just a suggestion, omit the word "strongly" . I feel that it is a subjective term to dramatize a statistically significant difference that may not necessary be clinically significant to some. This is a stylistic suggestion

18. P.19 – table 1- Suggest removing "significant difference" form the title as it is obvious from the data that the p-values <0.05 and thus statistically significant. May I suggest " Oral health and Oral Health Behavior between children from Low income and Middle-to – High income families" . Then at the bottom of the table you can asterisk (*) how the paper defines low income as those children that access the Maximum Bill" . This is a stylistic suggestion.

19. P.19 – table 1- give 95%CI rather than SD

20. P.19 – table 1- Not sure why the "N's" of the care index, the treatment index and the restorative index only include the DMF>0. I thinks this has to do with my confusion of how these indices are calculated (see comment 7 above). For example the Care Index for the NO's = 544. Is this the number out of a total of 1602 No's with DMF>0? Or in other words, 1058 No's had DMF =0?

21. P.20 – table 2- May I suggest changing the title to something like " Dental Compliance and Caries Free proportions between children from Low income and Middle-to –High income families" . Then at the bottom of the table you can asterisk 1(*) how the paper defines low income as those children that access the Maximum Bill" AND asterisk2(^) that these are dichotomous explanatory variable AND triple asterisk3 (pick another symbol) " at least one dental visit in three different years over a four year period , excluding urgency treatments." This is a stylistic suggestion.

	Would you be willing to review a revision of this manuscript? Yes I believe the data presented here is relevant to clinical practice. I am willing to review a revision.

REVIEWER	Rodrigo Lopez Professor of Periodontology, Aarhus University, Denmark.
REVIEW RETURNED	06-Apr-2017

GENERAL COMMENTS	1. The idea and the results are not novel. The authors ought to explain why this paper is relevant. 2. Was there parental consent involved? What kind of consent was used? 3. Some associations are mild, other are strong. The authors can elaborated on this. 4. I think that the authors could address the association of several covariates in multiple regression analyses. This could add to the study. E.g., was plaque playing a role in the associations on caries? 5. 'Oral health aspects' in the title is very unspecificic. I would suggest to focus on the main outcome and revise title accordingly.

REVIEWER	Associate Professor Zlatko Ulovec, DMD, MD, PhD School of Dental Medicine University of Zagreb, Department of Social Medicine and Epidemiology, Croatia
REVIEW RETURNED	06-Apr-2017

GENERAL COMMENTS	No major comments

VERSION 1 – AUTHOR RESPONSE

Reviewer: 1
Reviewer Name: Chun CHANG
Institution and Country: Peking UNiversity Health Science Center, Beijing, China
Please state any competing interests or state 'None declared': None declared.

1. Sampling process

In the part of abstract, methods and discussion, the auther mentioned that the respondents were selected randomly.

Q1. Totally 2216 children were investigated in 105 schools. It is suggested to present how to estimate the sample size.

In the original article was mentioned that "the sample size was determined based on a confidence level of 95% and a margin of error of 2.5%". The authors want to add that there were different sample size estimations, depending on the variability of the different outcome variables. The authors decided to include as many children as practically possible, based on the availability of three mobile dental units and the number of school days.

Q2. How to select 105 schools within all 2340 schools? Whether the distribution of "15% GO, 15% OGO, 70% VGO" was showed in the 105 schools? and How many special schools in the samplized

schools? It is necessary to explain whether the 105 schools could represent all the 2340 schools.

Schools were selected, based on a two-step stratification. In the first step, a stratified randomisation was executed at school-level, based on three strata: number of pupils, region and educational network. For this reason, the distribution of GO, OGO and VGO was equal for both the total population and the sample.
In the next step, randomisation occurred at the individual level.

Text reference p6:

Data were collected in 2014 from a representative sample of 2,216 primary school children in 105 different schools in Flanders. The total study population is estimated to be about 68000 children in 2340 schools. Schools were randomly selected, based on a two-step stratification. In the first step, a stratified randomisation was executed at school-level, based on three strata: number of pupils, region and educational network. In the next step, randomisation occurred at the individual level. There was an oversampling of 2% for schools with assistance from special education for disabled children or children with learning or educational difficulties. The sample size was determined based on a confidence level of 95% and a margin of error of 2.5%. There were several sample size estimations, depending on the variability of the different outcome variables. The authors decided to include as many children as practically possible, based on the availability of three mobile dental units and the number of school days.

2. Questionnaire pretest
Q1. How many children were measured in the pretest? and how to recruit them?

The questionnaire was tested in a convenience sample of 25 children from one school in Flanders, with the same age as the study population.

Q2. What indicators were applied to present discriminatory power and reliability? what analysis methods were used to analyze the indicators? and in "A higher score out of ten correlates to more knowledge and a better attitude. ", the score is?

It is right that more information was needed to understand this section. This additional information is mentioned below.
Internal consistency was analysed by means of the Cronbach's Alfa, resulting in a score of 0.75, which fits into the required interval of 0.70

Text reference p8
Both knowledge and attitude were assessed by a validated and reliable questionnaire, answered by the children. A higher score out of ten correlates to more knowledge and a better attitude. An expert panel tested the content validity of the items, after which the questionnaire was pretested in a class of 25 primary school children (convenience sample) on two different time points (test-retest). Internal consistency was analysed by means of the Cronbach's Alfa, resulting in a score of 0.75, which fits into the required interval of 0.70

3. uncomplete records and missing data
Q1. It is suggested to show the proportion of children eligible for the "Maximum Bill" in both responders and non-responders present in results.
Q2. to compare the social status indicators in two group, normally t-test or cross table was used, but not correlation analysis. In page 9, " there was no relationship between…" may cause misunderstanding.

The original section could be confusing. For this reason, the authors have reformulated this paragraph.

Text reference p10:
Sample consisted of 2,216 Flemish primary school children with a mean age of 11.25 years (SD 0.68). Data analysis was performed in 88.2% (n=1,954). Incomplete records were due to failure to obtain consent and child's absence from school on the day of examination. From these 1,954 children, 1,771 completed the questionnaire. Comparing the social status of responders and non-responders, the proportion of children eligible for the 'Maximum Bill' was equal for both groups (Chi Square Test; p=0.4).

4. First paragraph in Page 13
"basic dental costs are completely reimbursed in Belgium for all children under the age of 18, so in fact differences in utilization of health care services for financial reasons are not expected. However, in most dental practices, the often high dental fee needs to be paid first by the client, to get it reimbursed by the health insurance agencyafterwards. " It seems that the author concerned financial factor still the main reason for lower rate of oral health service utilization for the underprivileged children. While, it may need to concern also that the parents of low social class took less awareness of the imporatance of their children's oral health but not financial reason.

We have added the proposed nuances in this section.

Text reference p13:
Further, 37.36% of the Belgian dentists did not take part in the fee convention, bearing a risk of potentially increased dental costs. The authors cannot draw conclusions in this respect, but want to express the need to determine the principal cause(s) of oral health inequalities. The specific provider payment method can be one of the factors, but probably not the only one. Regarding knowledge and attitude of the children in this study, there are statistically significant differences between both social subgroups. However, a mean difference of 0.27 in attitude (on a score out of ten) might be of little clinical relevance to explain the existing inequalities. For children's knowledge, this gap is bigger, with a mean difference of 0.80 in knowledge scores. Differences in knowledge and health literacy, attitude and lifestyle need further investigated, not only for children, but also for the parents.

Reviewer: 2

Reviewer Name: Ben Balevi
Institution and Country: University of British Columbia , Canada
Please state any competing interests or state 'None declared': None I know of

1. There are some minor grammatical inconsistency through out the paper . I have tried to identify a few of them. Also parts of the paper may benefit from some stylistic changes in order to improve its clarity .

2. ABSTRACT – (page 3, line 44-52) I prefer that results be given with their associated 95%Confidence Interval (95%CI). For example; 78.4% (??95%CI) , 88.4% (??95%CI)and 12.6% (??95%CI) Also only one of the Oral health outcomes (%Caries Free) and one Dental compliance outcome (dental attenders) are given. Yet the conclusion (page 3, Line 54-58) States " … Oral hygiene, oral health care … are strongly negative affected… " without giving any results for these outcomes in the abstract's results section.

We made some adaptations to clarify the abstract and to avoid contradictions. However, due to word count limitations, we could not describe the different scores for care level separately (and so used the less significant p-value to summarize)
Regarding the 95%CI, I would like to refer to question 10

Text reference Abstract:
Results: Underprivileged children had higher D1MFT (95%CI [0.87-1.36]), D3MT (95%CI [0.30-0.64]) and plaque scores (95%CI [0.12-0.23], and lower care level (p<0.02). In the low-income group, 78.4% was caries free, compared to 88.4% for the other children. Half of the low-income children could be considered as regular dental attenders, whether 12.6% did not have any dental visit during a five year period.

3. Strengths and Limitations (page 4 line 15) Not "All aspects of oral health … behavior" are considered as outcomes such as gingival index and frequency of brushing are not considered. I would suggest changing "ALL" to " Many" or " A number of "

We have refined this section, and displaced the entire paragraph into the discussion section.

Text reference p14
The authors understand that the oral health status of Belgian children might be of less relevance in international literature. Although, this survey describes a very relevant theme: social inequalities in health. Off course, many other authors did research on this topic. However, the present study certainly has an added value. What pleads in favour, is the large sample of children with the same age, but more important, the objective and reliable link that was provided between children's oral health, their social status and their oral health care utilization. Oral health was investigated by calibrated and blinded dentists. Afterwards, these findings were linked to people's social class, not by interviewing the patients or their parents, but by exploring data of the national health institute. In this way, dental examiners were blinded, and people could not 'hide' their social status for the researchers. Furthermore, the same database revealed the most reliable information on oral health care utilization. Mostly, dental attendance is assessed by means of a questionnaire, inevitably leading to bias. In this survey, every single dental visit of a child could be linked to its corresponding record. It is obvious that this kind of survey requires a strict procedure, to ensure children's medical data and privacy. Because of the sensitive character of the information, studies with the same setting are very rare. A short literature search on Pubmed with the following string "Oral Health"[Mesh] AND "health care utilization"[All Fields]" resulted in only 7 hits. Two Nigerian surveys reported on almost the same subject, but both of them used a self-administered questionnaire (20-21).

4. Page 6 Line 5 – I think the word "yet" at the end of the sentence should be omitted.
The sentence has been adapted and is marked in red in the revised manuscript.

5. Page 6 line 23 – replace " took" with "take" (i.e.,… dentist partially or completely TOOK part in this convention)
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6. P. 8 Line 16 – replace "are" with "were" (i.e., " … lesion restricted to the enamel WERE taken into account)
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7. P8 Lines 18-28. This section must better define the variables in the equations. For example. RI = Ft/D3Ft. what does Ft mean? (Filled teeth?) what does D3Ft mean? (the sum of all unrestored D3 and Ft ? if so then the formula should be D3+Ft). The same is true with the care index and treatment

index formula; define all variable in the equation.

This remark is very relevant. We are used to this formula, although it is formulated mathematically incorrectly, as you noticed. We explained the term 'Ft', which is indeed 'filled teeth', and adjusted the formulas to make them more understandable.
I would like to explain the relevance of these different indices briefly, which I will add also in the discussion section:
-Restorative Index (RI= (Ft/(D3+Ft)) *100): "proportion of the decayed teeth being filled". This index does not consider the missing teeth, because there can be uncertainties whether these teeth were removed due to caries or for other reasons (trauma, periodontal infection).
-Care Index (CI= (Ft/(D3+M+Ft))*100): "proportion of the decayed teeth being 'restored' by means of a filling". This index does not consider a tooth extraction as a 'solution', but as part of the problem. You are literally 'missing' a tooth, it is seen as a 'lost chance'.
-Treatment Index (TI= ((M+F)/(D3+M+Ft))*100): "the proportion of the decayed teeth being filled". This index considers tooth extraction as part of the solution, because it removes a (potential) focus of infection. It gives the same value to fillings and extractions.

We cannot consider one of these indices as 'the one and only'. It is good to calculate them separately, to notice the subtle differences. When there is a big difference in Care index, but not in treatment index, it means that one of the groups received more tooth extractions, which can be relevant to give an idea of the severity of the disease and the way of treating it.

Text reference p7
DMFT was used as outcome variable to count the number of decayed (D), missing (M) and filled (F) teeth. Caries detection was based on the International Caries Detection and Assessment System (ICDAS), using six subcategories of caries going from first visible change in enamel (score 1) to extensive cavity with visible dentin possibly reaching the pulp (score 6). Both caries at D1 level (score > 0: early enamel lesions and decay into dentine) and D3 level (score ≥4: obvious decay into dentine, excluding early lesions restricted to the enamel) were taken into account. The level of provided care has been approached through the restorative index (RI= (Ft/(D3+Ft)) *100), with Ft standing for "filled teeth", care index (CI= (Ft/(D3+M+Ft))*100) and treatment index (TI= ((M+F)/(D3+M+Ft))*100), all ranging from 0 to 100%. These indices can only be calculated for those children having a DMFT score > 0. For the other children (DMFT=0), it is mathematically impossible to calculate RI, CI and TI, since the formula should request to divide by "0". Restorative and treatment index were also dichotomized to divide subjects into two groups: children without untreated caries (RI = 100%, TI=100%) and children with untreated caries (RI<100%, TI<100%).

8. P8 lines 57 – replace "profit" with "part" (i.e, "… those who cannot take PART of this system)
The sentence has been adapted and is marked in red in the revised manuscript.

9. METHODS SECTION - not clear if the investigators where blinded to the SES of the children they examined

Oral health was investigated by calibrated and blinded dentists. Afterwards, these findings were linked to people's social class, not by interviewing the patients or their parents, but by exploring (coded) data of the national health institute. In this way, dental examiners were blinded, and people could not 'hide' their social status for the researchers (who were not part of the dental-examiners).

We inserted additional information into the revised manuscript, to answer your question.

Text reference p7
In all participants, oral health condition was recorded by visual inspection with a mobile dental unit in

school premises by 44 well-trained and calibrated dentist-examiners. All examiners were blinded to the socioeconomic status of the children they examined. Calibration was undertaken to avoid bias, using a series of full-mouth photographs simulating the clinical examination of patients, set up in a PowerPoint presentation. Intra Class Correlation Coefficient (ICC) for all examiners was 0.86 with a 95% confidence interval of 0.82 to 0.90. General kappa score was 0.72.

10. RESULTS SECTION … I like 95%CI associated with all outcomes in result section as well as in the Tables 1 &2 (pages 19 -20, also see comment 2 above). Although SD are given in Table 1, 95%CI reflect on the precision of the estimated (mean) as well as the magnitude and direction of the difference, thus making them more applicable to clinical decision making.

In all statistical analyses, the authors made the choice to use the mean and standard deviation for descriptive statistics.
However, it is right that a 95%CI for the differences between groups is of clinical relevance to have a better view on the 'range' in which the real difference is situated. For this reason, we added the mean difference and the 95%CI of these differences in table 1, as you suggested.
In our opinion, 95%CI and SD are of equal relevance in the descriptive analyses. To replace all SD's by 95%CI, we should have to redo all analyses…

11. P10 Line 33-33 " mean age of 11.25 years (+-0.68)". I am not sure if the 0.68 is the SD or 95%CI

This was the standard deviation, but indeed, it was not clearly mentioned. We adapted this in the manuscript:

Sample consisted of 2,216 Flemish primary school children with a mean age of 11.25 years (SD 0.68).

12. P. 10 line 33 … replace " could be" with "was" AND " Uncomplete " with "Incomplete" AND "are" with "were" (i.e., Data analysis WAS performed in 88.2% (n=1954) . INCOMPLETE records WERE …")

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13. P. 11 line 7-8 replace "was" with "were" (i.e., …78.4% (95%CI if possible :)) of the low- income children WERE caries free…)

The verb has been replaced and the sentence is marked in red in the full text.

14. P.12 Line 50-51 . How about adding "arithmetic " between 10% and "gap" (i.e., A 10% ARTHMETIC gap emerges…". This avoids confusing the absolute difference of CI, TI and RI between the two groups with relative difference between the two groups. Just a stylistic suggestion.

We have added the word in the sentence. It is good that the manuscript was reviewed by a native speaker to observe these subtleties.

15. P.13 lines 12-20. This part of the discussion brings out some great points regarding the barrier of out of pocket cost to the "underprivileged" cohort. I am not sure exactly how the "Maximum Bill " works , but if it still requires the family to pay "out of pocket" the difference before they can collect it back from the government program, then it would require the family to have the money which they may not have in the first place. Such a barrier adds to the "access to care" problem and possibly another reason why the low income cohort show poorer "dental compliance" outcomes

This remark truly makes sense, and it reflects what we see and 'feel' in our dental practices. Although governments and dental professional organisations like to proclaim that all dental care for children is "for free", we want to notice that advancing the dental fee to get it back afterwards (within a few weeks), is not the same as receiving dental care "for free". If the family budget is limited, there is no space or no priority to pay the dentist first. However, this is only a feeling, which is difficult to measure, in particular in this cross-sectional setting. For this reason, we don't want to draw conclusions, because there might also be other reasons, as suggested by one of the other reviewers. We made some adaptations in the discussion section.

The system of the "Maximum Bill" calculates a cost limit for medical care for every citizen. The higher the family income, the higher this limit. When medical costs exceed this limit, they will be entirely and automatically reimbursed. So, when this measure needs to be applied, it means that families are facing financial difficulties, because of low income and/or major medical costs. Since this system works independently and automatically (people don't have to apply for it), we do not miss vulnerable subjects in our analysis.

As we mentioned, dental care in Belgium is entirely reimbursed, so the Maximum Bill does not have an additional financial value for the child with a dental need (only for its parents' dental costs). In this survey, we just used it as an indicator to identify the most vulnerable children.

We tried to explain this measure more precisely in the introduction section.

Text reference p 5:
To reduce inequalities in (oral) health, some national government initiatives have been implemented. Underprivileged individuals can be entitled to an increased allowance for health care interventions when the family income is low. In case of excessive medical costs, people can also have access to the mechanism known as the "Maximum Bill", calculating a cost limit for medical care for every individual. The higher the family income, the higher the cost limit. When medical costs exceed this limit, they will be entirely and automatically reimbursed.

16. DISCUSSION – should also reflect on the strength and limitations of the study. Although the authors include these reflections on page 4, I am use to seeing them in the discussion section.

The strengths and limitations are integrated into the discussion section.

17. P. 14 line 16… just a suggestion, omit the word "strongly" . I feel that it is a subjective term to dramatize a statistically significant difference that may not necessary be clinically significant to some. This is a stylistic suggestion.

Although stylistic, it is a relevant suggestion, which have been adapted.

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The proposed title is better than the original, so we have adapted it. Because there was already another asterisk at the bottom of the table, we preferred to define the low income families in parentheses: "Oral health and oral health behaviour between children from low income (utilizing the 'Maximum Bill') and middle-to-high income families."

19. P.19 – table 1- give 95%CI rather than SD
Adapted in manuscript.

20. P.19 – table 1- Not sure why the "N's" of the care index, the treatment index and the restorative index only include the DMF>0. I thinks this has to do with my confusion of how these indices are calculated (see comment 7 above). For example the Care Index for the NO's = 544. Is this the number out of a total of 1602 No's with DMF>0? Or in other words, 1058 No's had DMF =0?

It is right that the 544 children in table 1 are those having a DMFT > 0, out of a total of 1602. This means that these 544 children have experienced tooth decay at least once in their lifetime. This tooth decay can still be present (D-component), or the tooth can be filled (F-component) or extracted (M-component). We tried to clarify the formulas of the three indices above: restorative index (RI= (Ft/(D3+Ft)) *100), with Ft standing for "filled teeth", care index (CI= (Ft/(D3+M+Ft))*100) and treatment index (TI= ((M+F)/(D3+M+Ft))*100), all ranging from 0 to 100%.

Mathematically, it is impossible to calculate the RI, CI and TI for the other children (having DMFT=0), since we should have to divide by "0", which is asymptotic to infinity and so impossible. Also clinically, it would be irrelevant, because the indices want to calculate the proportion of the decayed teeth which have been restored or extracted. If there was no tooth decay at all, these indices are useless.

We added this information in both the methodological and the discussion section

Text reference p11
All included oral health parameters were strongly significantly affected by participants' social class. Not only caries experience, by means of DMFt and DMFs, proved to be higher in underprivileged groups, but also oral hygiene (plaque index) and the level of care seemed to depend on families' social context. This level of care was assessed by means of the restorative index, care index and treatment index. These indices could only be calculated for children having a DMFT > 0. This was mathematically declared in the methodological section, by explaining that it is impossible to divide by "0", which would be the case for those having a DMFT =0. Also clinically, this would be irrelevant, because the indices aim to calculate the proportion of the decayed teeth which have been restored or extracted. If there is no caries experience at all (DMFT=0), these indices are not applicable.

An arithmetic gap of 11.87, 8.34 and 9.96 emerges when comparing Care index, Treatment index and Restorative index for middle/high-income and low income children, in disadvantage of the latter group. The three indices do not all have the same meaning. Restorative index (RI= (Ft/(D3+Ft)) *100) does not consider the missing teeth, because there can be doubts whether teeth were removed due to caries or due to other factors (trauma, periodontal infection). Care index (CI= (Ft/(D3+M+Ft))*100) partially involves the missing teeth, but the index does not consider a tooth extraction as a 'solution', but as part of the problem. Children are literally 'missing' a tooth, so tooth extraction it is seen as a 'lost chance'. On the other hand, Treatment Index (TI= ((M+F)/(D3+M+Ft))*100) proposes tooth extraction as part of the solution, because it removes a (potential) focus of infection. It gives the same value to fillings and extractions. None of these indices can be considered as 'all-embracing', so it is good to compare them. When two subgroups differ significantly in restorative index, but not in treatment index, this means that one of the groups received more tooth extractions, which can be relevant to explore the severity of the disease and the way of treating it. The present findings suggest that the low-income children had more teeth being extracted, although it is hard to determine the clinical relevance of a 1% difference between treatment index and restorative index.

21. P.20 – table 2- May I suggest changing the title to something like " Dental Compliance and Caries Free proportions between children from Low income and Middle-to –High income families" . Then at the bottom of the table you can asterisk 1(*) how the paper defines low income as those children that

access the Maximum Bill" AND asterisk2(^) that these are dichotomous explanatory variable AND triple asterisk3 (pick another symbol) " at least one dental visit in three different years over a four year period , excluding urgency treatments." This is a stylistic suggestion.

We changed the title of the table, but wrote the description of low income families between parentheses: "Dental Compliance and Caries Free proportions between children from low income (using the "Maximum Bill") and middle-to-high income families"

Would you be willing to review a revision of this manuscript? Yes
I believe the data presented here is relevant to clinical practice. I am willing to review a revision.

Reviewer: 3

Reviewer Name: Rodrigo Lopez
Institution and Country: Professor of Periodontology, Aarhus University, Denmark.
Please state any competing interests or state 'None declared': None declare

Please leave your comments for the authors below
1. The idea and the results are not novel. The authors ought to explain why this paper is relevant.

The authors understand that the oral health status of Belgian children might be of less relevance in international literature. Although, it describes a very relevant theme: social inequalities in health. Off course, many other authors did research on this topic. However, the present study certainly has an added value. What pleads in favour of the present study, is the large sample of children with the same age. But more important is the objective and reliable link that was provided between children's oral health, their social status and their oral health care utilization. Oral health was investigated by calibrated and blinded dentists. Afterwards, these findings were linked to people's social class, not by interviewing the patients or their parents, but by exploring data of the national health institute. In this way, dental examiners were blinded, and people could not 'hide' their social status for the researchers. Furthermore, the same database revealed the most reliable information on oral health care utilization. Mostly, dental attendance is assessed by means of a questionnaire, inevitably leading to bias. In this survey, every single dental visit of a child could be linked to its corresponding record. Off course, this kind of survey requires a strict procedure, to ensure children's medical data and privacy. Because of this sensitive character of the information, studies with the same setting are very rare. A short literature search on Pubmed with the following string "Oral Health"[Mesh] AND "health care utilization"[All Fields]" resulted in only 7 hits. Two Nigerian surveys reported on almost the same subject, but both of them used a self-administered questionnaire (Onyejaka et al, 2016; Ajayi & Arigbede, 2012).

Onyejaka NK, Folayan MO, Folaranmi N. Barriers and facilitators of dental service utilization by children aged 8 to 11 years in Enugu State, Nigeria. BMC Health Serv Res. 2016 Mar 15;16:93. doi: 10.1186/s12913-016-1341-6.
Ajayi DM, Arigbede AO. Barriers to oral health care utilization in Ibadan, South West Nigeria. Afr Health Sci. 2012 Dec;12(4):507-13.

2. Was there parental consent involved? What kind of consent was used?

At the end of the methodological section, this was mentioned under 'ethical aspects':
The present study was approved by the Ethics Committee of the University Hospital Ghent (2010/061). All parents signed an informed consent form prior to data collection. All schools received

information about the study protocol and agreed to participate. Children requiring dental treatment or periodic recall were referred to the local dentist.

3. Some associations are mild, other are strong. The authors can elaborated on this.

It was not completely clear whether the authors should elaborate on the statistical strength of the associations, or their clinical relevance. We tried to add some additional information in the discussion section.

Text reference p 11

An arithmetic gap of 11.87, 8.34 and 9.96 emerges when comparing Care index, Treatment index and Restorative index for middle/high-income and low income children, in disadvantage of the latter group. The three indices do not all have the same meaning. Restorative index (RI= (Ft/(D3+Ft)) *100) does not consider the missing teeth, because there can be doubts whether teeth were removed due to caries or due to other factors (trauma, periodontal infection). Care index (CI= (Ft/(D3+M+Ft))*100) partially involves the missing teeth, but the index does not consider a tooth extraction as a 'solution', but as part of the problem. Children are literally 'missing' a tooth, so tooth extraction it is seen as a 'lost chance'. On the other hand, Treatment Index (TI= ((M+F)/(D3+M+Ft))*100) proposes tooth extraction as part of the solution, because it removes a (potential) focus of infection. It gives the same value to fillings and extractions. None of these indices can be considered as 'all-embracing', so it is good to compare them. When two subgroups differ significantly in restorative index, but not in treatment index, this means that one of the groups received more tooth extractions, which can be relevant to explore the severity of the disease and the way of treating it. The present findings suggest that the low-income children had more teeth being extracted, although it is hard to determine the clinical relevance of a 1% difference between treatment index and restorative index.

Text reference p 13
Regarding the financial aspect, basic dental costs are completely reimbursed in Belgium for all children under the age of 18 without distinction, so in fact differences in utilization of health care services for financial reasons are not expected. However, in most dental practices, the often high dental fee needs to be paid first by the client "out of pocket", to get it reimbursed by the health insurance agency afterwards. Third party payment, in which the health insurance agency pays the dental fee directly to the dental practitioner instead of the client, is allowed for all minors, but not well established. Further, 37.36% of the Belgian dentists did not take part in the fee convention, bearing a risk of potentially increased dental costs. The authors cannot draw conclusions in this respect, but want to express the need to determine the principal cause(s) of oral health inequalities. The specific provider payment method can be one of the factors, but probably not the only one. Regarding knowledge and attitude of the children in this study, there are statistically significant differences between both social subgroups. However, a mean difference of 0.27 in attitude (on a score out of ten) might be of little clinical relevance to explain the existing inequalities. For children's knowledge, this gap is bigger, with a mean difference of 0.80 in knowledge scores. Differences in knowledge and health literacy, attitude and lifestyle need further investigated, not only for children, but also for the parents.

4. I think that the authors could address the association of several covariates in multiple regression analyses. This could add to the study. E.g., was plaque playing a role in the associations on caries?

The present findings are part of a broader longitudinal survey to examine the effects of a four-year longitudinal oral health promotion program on oral health inequalities. In this first step, a cross-sectional study was executed to determine differences between subgroups and so to emphasize the existing (unequally distributed) oral health problems and the need to tackle this. The authors preferred

introducing multivariable analyses on long term after the intervention to consider its effects (in a model with different covariates)

5. 'Oral health aspects' in the title is very unspecificic. I would suggest to focus on the main outcome and revise title accordingly.
According to this remark, we changed the title into "Socioeconomic inequalities in caries experience, care level and dental attendance in primary school children in Belgium: a cross-sectional survey"

Reviewer: 4

Reviewer Name: Associate Professor Zlatko Ulovec, DMD, MD, PhD
Institution and Country: School of Dental Medicine University of Zagreb, Department of Social Medicine and Epidemiology, Croatia
Please state any competing interests or state 'None declared': None declared

Please leave your comments for the authors below
No major comments

VERSION 2 – REVIEW

REVIEWER	Ben Balevi University of British Columbia , Vancouver, Canada
REVIEW RETURNED	12-May-2017

GENERAL COMMENTS	Summary of My understanding
	I generally feel that all of my concerns were adequately address. I appreciate the effort the authors made in qualifying each one of my comments in such a way that made me further appreciate the contribution this manuscript to our current knowledge base
	Never the less, I have some minor comments
	1. I did not find the updated Abstract in this resubmitted review. This is likely an oversight and will leave it to the editor to assess its quality.
	2. P.30 line 42-43 & P.34 line 54-55 - Needs Correction The formula of TI , in the numerator replace the variable defining "filled teeth" from F with Ft; [i.e., $TI= ((M+Ft)/(D3+M+Ft))*100$]
	3. I feel it is not necessary to put strength and weakness as a sub-heading of the discussion. I am use to seeing strength and weakness flow with the rest of the discussion.

VERSION 2 – AUTHOR RESPONSE

Once again, all authors want to express their gratitude towards all reviewers. We are very pleased that our changes and further elaboration were able to answer the first revision.

Regarding the existing minor comments, we adapted everything in the uploaded manuscript.

It was asked by the editors to paste the revised abstract in a separate text box. To be complete, we

will also paste this abstract in this response box AND in the uploaded main document to ensure that it can also be found by the reviewers.

Abstract:

Objectives: Oral health inequality in children is a widespread and well-documented problem in oral health care. However, objective and reliable methods to determine these inequalities in all oral health aspects, including both dental attendance and oral health, are rather scarce.

Aims: to explore oral health inequalities and to assess the impact of socio-economic factors on oral health, oral health behaviour and dental compliance of primary schoolchildren.

Methods: Data collection was executed in 2014 within a sample of 2,216 children in 105 primary schools in Flanders, by means of an oral examination and a validated questionnaire. Intermutual Agency database was consulted to objectively determine individuals' social state and frequency of utilization of oral health care services. Underprivileged children were compared to more fortunate children for their mean DMFt, DMFs, Plaque index, Care Index (CI), Restorative Index (RI), Treatment Index (TI), knowledge and attitude. Differences in proportions for dichotomous variables (RI100%, TI100% and being a regular dental attender)were analysed. The present study was approved by the Ethics Committee of the University Hospital Ghent (2010/061). All parents signed an informed consent form prior to data collection. All schools received information about the study protocol and agreed to participate. Children requiring dental treatment or periodic recall were referred to the local dentist.

Results: Underprivileged children had higher D1MFT (95%CI [0.87-1.36]), D3MT (95%CI [0.30-0.64]) and plaque scores (95%CI [0.12-0.23], and lower care level ($p<0.02$). In the low-income group, 78.4% was caries free, compared to 88.4% for the other children. Half of the low-income children could be considered as regular dental attenders, whether 12.6% did not have any dental visit during a five year period.

Conclusion: Oral health, oral hygiene, oral health care level and dental attendance patterns are negatively affected by children's social class, leading to oral health inequalities in Belgian primary school children.