Author's response to reviews

Title: A reappraisal of the quantitative relationship between sugar intake and dental caries: the need for new criteria for developing goals for sugar intake.

Authors:

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Version: 3 Date: 23 July 2014

Author's response to reviews: see over
Dear Sir/Madam,

Re: MS: 7981649021258637
Research article
The quantitative relationship between sugar intake and dental caries; the need for new criteria for developing goals for sugar intake
Aubrey Sheiham and Philip T James
BMC Public Health

With reference to your email dated 21 July 2014, here are our responses to the Reviewers comments.

Reviewer 1
General comments.
In the light of the recent proposal by WHO/NUGAG to recommend a 5% limit on sugars intake to reduce the prevalence of caries, this is a valuable contribution to an important current debate on factors that should determine sugars intake. The paper is primarily a re-analysis of the early Japanese data on sugars intake and caries in children. The authors show that caries is mainly a disease of adults, is more common worldwide than probably any other chronic illness for which there are significant costs and that the apparent safety threshold of 10% E should no longer apply.
There are important comments on the global burden of caries and its economic consequences.

General comments:
1. Please explain what is meant by the term “sugars” and especially terms such as “non-milk extrinsic sugars” (l.97 and l. 279). The US has a definition for "added" sugars that differs from the WHO definition of "free" sugars. What is important for caries?
2. Are sucrose and fructose treated equally in the dental caries story?

Specific comments.

Response:
We thank the reviewer for the thoughtful analysis and highlighting issues where more specificity is required.
We have added: Sugars in this international context relate to national statistics for sucrose availability but in the US, fructose syrups are included and in the UK the term "non-milk extrinsic sugars" is used to define these non-lactose disaccharides with maltose making a negligible contribution. It is well recognised biologically that the monosaccharides fructose plus glucose in combination can also cause caries, but in practice most of the statistics in these re analyses relate to sucrose intake or that available for consumption. Intakes refer to
sugars specifically available for consumption after correction for waste and other non-food uses of sugar. The statistics do not take account of sugars contained in dried fruit. These intakes refer to absolute intakes and not to the frequency of sugar intake during the day. Sugar intakes specified in kg/caput/yr were expressed in energy% by taking the energy as 4kcal/g for sugar and a global national average energy intake (including children) of 2,000 kcal/caput/day.

1. L97. What do national data on sugars intake really measure? Is it just industrial amounts of sugar imported? Or does it take account of sugar naturally present in the diet, such as dried fruit in cereals etc.

Response
We have added: Intakes refer to sugars specifically available for consumption after correction for waste and other non-food uses of sugar. The statistics do not take account of sugars contained in dried fruit. These intakes refer to absolute intakes and not to the frequency of sugar intake during the day.

2. L195/196. It might be worthwhile pointing out that it is not possible to separate the frequency of sugars consumption from the daily amount in epidemiological studies.

Response
These intakes refer to absolute intakes and not to the frequency of sugar intake during the day.


Response. Corrected

3. There are no legends, and references, for the figures

Response. Titles and Legends to Figures were included on page 18.

Titles and Legends to Figures
Figure 1. Three-dimensional model of the cumulative numbers of caries in the upper central incisor teeth. Data were plotted on a log scale, by post-eruptive tooth age up to 8 years, and related to the average annual sugar consumption per head in Japan from 1935 to 1957 (Takeuchi et al [12], with permission).

Figure 2. Relationship between annual per capita sugar consumption and annual caries incidence in lower first molar teeth. Data based on 10,553 Japanese children whose individual teeth were monitored yearly from the age of 6 to 11 years of age... Data plotted on a log scale. (Adapted from Koike [13]).

Figure 3. The decayed, missing and filled teeth (DMFT) and filled tooth surfaces (DMFS) in a national USA sample showing that the numbers of DMFS was over 70 by 75 years. (Adapted from Dye et al [19]).

Reviewer 2.
Reviewer's report
General comments
Paper reads in parts like more of a polemic than a reasoned scientific analysis. There is some inaccuracy in both writing and terminology which does not help.
DMF scores are not ‘caries prevalence’ – the prevalence of caries is the % of people with 1+teeth having been affected. DMF scores are a summary measure of caries experience, sometimes referred to as caries ‘severity’.

Response
We are very sorry that the reviewer considers the paper a “polemic rather than a reasoned scientific analysis” but then does not give details of our lack of reasoned analysis. We were forced to condense the analyses and show how we with others had construed the burden of
dental caries and its relationship to sugar incorrectly. So this was a stark admission of incorrect interpretation by one of us (AS) 25 years ago and a recognition that these earlier views still prevail in many dental circles. The vast majority of the referee's comments relate to style, grammar and correction of terms for which we are grateful.

We have clarified a point on confounding as follows: (Lines 57 to 63, in current version).

“Given the acceptance that sugar intake is the primary cause of dental caries with variations in the incidence and prevalence reflecting the impact of the above modifying factors, the usual caveats relating potentially to unknown causes do not apply because there is no other mechanism for inducing caries so the only confounding factors, namely, tooth brushing and the use of fluoride in drinking water or toothpaste serve to reduce the magnitude of the simple relationship between sugar intake changes and caries incidence.”

Section-specific comments

Title
I don’t know why the semi-colon is used – surely that should be a colon. 
Response. Agreed; done.

Abstract
Line 21 – ‘incidence’ is too specific, given what the paper contains – the authors are better advised to use the term ‘caries experience’.
Response. We consider that the term incidence is correct as we are dealing mainly with the numbers of new lesions identified by the original investigators on an annual basis so these extraordinarily detailed repeated examinations present some of the best evidence in the literature of the incidence of dental caries. The data in the Japanese studies are based on new lesions by post-eruptive tooth age for particular teeth. That is new lesions per year. Therefore the term incidence is correct.

Line 26 – insert ‘of’ before Japanese. Done
Line 28 – change ‘of’ to ‘on’. Done

Line 31 – what age group for adults? That particular sentence has structural problems.
Response. Reworded. Adults aged 65 years and older, living in water fluoridated areas where high proportions of people used fluoridated toothpastes, had nearly half of all tooth surfaces affected by caries.

Line 35 – ‘to sugar intakes'? reword so it means something meaningful.
Response. There is a robust log-linear relationship in sugar intakes from 0%E to 10%E sugar.

Introduction
43-44 – that 1st sentence is a sweeping statement which deserves some supporting references.
Response. This is such a truism that we did not consider it necessary to have references but we are grateful for the request to spell this out. We have now included a reference which relates to the latest global burden of disease studies undertaken by Chris Murray and his colleagues. Murray was responsible for defining the original first World Health Organisation reports on the global burden from all types of major diseases 15 years ago and is now working in Seattle and Harvard with the Gates Foundation and has reassessed this problem. So we have now included a strong reference to this: “Oral conditions affected 3.9 billion people, and untreated caries in permanent teeth was the most prevalent condition evaluated for the entire Global Burden of Disease 2010 Study with a global prevalence of 35% for all ages

Line 50 – insert a comma after ‘[1].’ and do that same in line 56 – after ‘caries’. Done
In line 59, remove that last comma – it does not need to be there. Done
Line 64 – reword – do not use ‘as’ where you mean ‘because’. Done
Line 67 – this needs to be a proper sentence – ‘these were’ after the semi-colon, and please add ‘studies’ at the end of the sentence. Done
Line 70 – insert ‘between’ after ‘than’. Done
Line 74 – hyphenate ‘cut off’, and insert a comma after ‘(<5%E)’. Done

Line 85-86 – might be useful and informative to frame a research question or two here.

Response
We do say why we are doing the study - which is, of course, the "research question". The objective is then set out as follows: Given therefore the renewed interest in the optimum intake for sugar intake now that dietary sugars have been shown to help induce excess weight gain and obesity [4], this paper re-examines the quantitative relationship between sugar intake and the development and the life-long burden of dental caries.

Methods
Line 89 – change ‘data’ to ‘studies’. Changed,
Line 94-96 – that is not a proper sentence. Changed. For example, we analyzed data from Japanese reports on national annual examination data of school children, based on nationwide sample surveys published by Ministry of Education and some local surveys kindly provided by colleagues.

Line 97 – data providing data – huh?

Response
Thank you for highlighting the rather crude choice of words. We have now changed the sentence to "From these sources we have selected data… ."

Line 99 - (and onwards) – change ‘caput’ to ‘head’. Done.

What is the source for those assumptions?

Response

We are intrigued by the reviewer's choice of words as seemingly he does not consider the relationship between sugar and dental caries as causal. Nevertheless we have rewritten this sentence to specify the features in more detail as follows.

"The annual incidence of observed dental cavitation in individual teeth was specified as caries by Japanese experts and the proportion of children affected with caries in each tooth..."
was expressed in relation to the carefully monitored dietary sugar available for use at a time of great food constraints in Japan. These data were re-examined bearing in mind that the authors had displayed their initial presentation in log terms. The time interval chosen for repeated examinations was one year and this population was assessed repeatedly over several years with the length of time for which each tooth had been exposed was estimated. The time of each tooth's eruption was already well known with some accuracy by this stage in Japan as elsewhere. Therefore given the robust nature of the repeated analyses of the annual rates of caries prevalence the authors could reasonably claim to be assessing the annual caries incidence in adolescents."

Line 111 - Name those 3 countries here. Done "Three countries, Ireland, Australia and the United States, where water fluoridation had been..."
Line 112 – change ‘of’ to ‘that they had’, and insert a comma after ‘fluoridation’.
Done Three countries, Ireland, Australia and the United States, where water fluoridation had been implemented for over 30 years, were selected on the basis that they had a legal requirement for universal water fluoridation, as well as the usual use of fluoride toothpastes \[17,18,19\].
Line 113 – change ‘As’ to ‘Because’. Done.
Line 114-115 – you cannot use the term ‘increase’ here – you need to say something like ‘a proportionally greater caries experience with greater sugar intakes’.
Done. Because a comprehensive systematic review, using similar methods has just been published \[3\] the analogous findings of a proportionally greater caries experience with greater sugar intakes with rising sugar intakes are not reported.

Line 117 – analyses? Details? Should we take it on faith?
Response
We say “Here, we assess the importance of differential tooth susceptibility to caries, the postponement of caries incidence by fluoride and the burden of caries on a life-time basis.” The reviewer asks for details. He need not take it on faith, but should look at the results of what we did. That does explain how we obtained the data.

Results
Line 123 – surely 13-19-year-olds (note the hyphenation – please do this in the other such instances in the paper) are adolescents, not children. Done. 13 to 19 year old adolescents
Line 124 – change ‘those’ to ‘adults’. Done
Line 125 – are you talking about permanent or deciduous caries? Caries in permanent teeth. They were 13 to 19 year old adolescents

Line 128-129 – ‘does not occur at any age’? But you just told us that it does affect 2%
- that statement is not accurate and smacks of the polemical...
Response
Changed to: Thus Sheiham’s study indicates that with very low intakes of sugars, caries rarely occurs at any age.

Line 130-131 – ‘Most’ is followed by reference to 2 studies.....
Response
Two cross sectional surveys indicate that there is a strong positive correlation, ranging from 0.72 to 0.95, between sugar consumption and DMFT \[7,11\].

Line 131-133 – in what way? Be more specific about that wartime stuff.
Response
Have changed to “Wartime analyses amplify the close correlation between sugar availability and the prevalence and severity of dental caries as seen in Norway \[9\], and in Europe generally during and after World War II and more recently in Iraq during the UN
sanctions [10].

Line 135 – insert a comma after ‘II’. Done.

Line 138 – we need more detail on that study – we are left to rely on these authors’ interpretation of those data.
Response
We changed the sentence to indicate that the authors of the study did the interpretation, not us. The results are shown in the Figures reproduced from the studies.
“In the studies, each tooth was examined separately at yearly intervals in each individual and showed a clear relationship between the average prevailing sugar intake levels and dental caries that had progressed to cavitation.”

Line 141 – ‘Dose – response’ – close it up to ‘Dose-response’ (although it is the wrong term to use anyway!). There are a couple of other examples of this in the paper and those should be fixed. Done.

Line 146 – Fig 2 – uses the term ‘incidence’ – should that be ‘increment’?
Response No, Incidence. As explained previously.

Line 151 – where? Who reported it?
Response
We clearly state that the findings are from the two papers we refer to.
“The positive correlation between sugars and caries was +0.7 with a log-linear relation at both lower and higher sugar intake levels for all tooth types if 1–8 years of sugar exposure is considered [11-14].”

Line 155 – confounders – more details please. Explain this further.
Response
We have clarified a point on confounding as follows: (Lines 57 to 63, in current version).
“Given the acceptance that sugar intake is the primary cause of dental caries with variations in the incidence and prevalence reflecting the impact of the above modifying factors, the usual caveats relating potentially to unknown causes do not apply because there is no other mechanism for inducing caries so the only confounding factors, namely, tooth brushing and the use of fluoride in drinking water or toothpastes serve to reduce the magnitude of the simple relationship between sugar intake changes and caries incidence.”

We state that “The relationship holds for both increases and decreases in sugars consumption which limits the possibility of confounders affecting that relationship.”
As the relationship holds for both increases and decreases in sugars consumption it is very unlikely that any other factor played a significant role. Obviously there were changes other than sugar consumption in Japan during the periods studied. If they played a part then the relationship would have changed. We know there was no water fluoridation nor were fluoride toothpastes available in Japan at that time.


158 – the ‘rate of caries’ – what, exactly, do you mean by that? Be more specific.
Response
least a doubling in the prevalence rate of caries in molars, 8 years after tooth eruption (Figure 1).
Line 159 – hyphenate ‘sugar caries’. Done

Line 160 – ‘reduces’ is the wrong term, and what do you mean by ‘prevalence’, exactly? And age-specific prevalence… We know from Griffin et al (JDR 2007; 86: 410-415) that the DMF score among adults is lower by about 27% among those in fluoridated areas, but we cannot say from that that fluoridation ‘reduces’ caries experience by 27%. Thus, the statement in this paper should be along the lines of ‘is associated with about 25% lower caries experience’…

Response. Agree. Thanks. Changed to: “Fluoride is associated with about 25% lower caries experience when sugar intakes are constant between 10-15%E in 12 year-old children [15].”

Line 163 – insert ‘relatively’ after ‘becomes’. Done.
Line 166 – ‘a comparison of a country’ should be ‘comparison within a country’. Done.
Line 169 – change ‘16 – 24’ to ‘16-24’. Why am I having to point out these elementary clangers? Done

Line 169-170 – what is meant by ‘had some dental caries experience in 4.6 teeth’? Sloppy writing

Response. Corrected to ‘had dental caries experience in an average of 4.6 teeth’

Line 170 – ‘35-44 year olds’ should be ‘35-44-year-olds’. Done.
Line 171 insert ‘mean’ before DMFT and get rid of that awful ‘compared to’. Done

“the mean DMFT was 13.3 and 16.0 in those living in non-fluoridated areas [17].”

Line 174-175 – you cannot say that it ‘increased 10-fold’ from 15-24 to 65+ - those were different people – all you can do is assume that that would occur. There are all sort of age, period and cohort effects operative which mean that you cannot make that simplistic statement. It needs rewording.

Response.

Agree. We changed the sentence to “; adults aged 65 years and older had ten times higher levels of caries than 15–24-year-olds [18].”

Line 176 – delete the second ‘countries’; it is not needed. Done
Line 178 – what is meant by ‘widescale’? Is that some sort of neologistic conflation of ‘widespread’ and ‘large-scale’?

Response. We meant widespread. Thanks

Line 181 – there are 148 possible surfaces – we usually do not count occlusals for anteriors. If we include possible root surfaces as well, there are 276 surfaces at risk.

Response. Have changed to sentence below because we are not sure whether root surfaces were included in study but consider it unlikely.

Line 184 – there is an awful compound word there (‘high sugar and fluoride intake’ – this is being used as a single adjective…) which needs to be hyphenated – it is preferable to reword that sentence so that this does not need to happen.

Response. Done. The majority of caries in permanent teeth occurs in adults, not in children. These findings are evident in countries with low as well as high sugar intakes irrespective of the fluoride intakes [16-23].

Line 197 – change ‘confectionary’ (adjective’) to ‘confectionery’ (noun). Done
Line 198 – hyphenate ‘short term’. And put a comma after ‘Nevertheless’. Done
Line 200 – ‘Cunhans’… Cunha Done

Line 207 – ‘Dose – response’ should be ‘Dose-response’, but see my earlier concerns about using that term… and ‘sugars intake’ should be ‘sugar intakes’.  

**Response**  
NUGAG and SACN use the term sugars. Done.

Line 216 – comma needed after ‘Clearly’. Done.

Line 221 - I would put ‘in practice’ in parentheses, given that it is a parenthetical statement/comment. Done.

Line 222 – ‘caries-free one-year’… Done. “when ‘in practice’ it was already evident that even incisor teeth which were caries-free one year post-eruption, did indeed develop caries as exposure to sugar continued.

Line 228 – ‘decreased’ is inappropriate – see above; ‘are lower’ is a more appropriate term. Done.

Line 240 – ‘and then into adulthood’ needs a supporting reference.  

**Response**  
Have given 2 references,


Line 247 – the sentence beginning ‘Although it..’ is not a stand-alone sentence.  

**Response**  
Changed to: Although it could be argued that those showing a very small increase in caries burden may have been particularly attentive to preventive measures after leaving school, yet on a population basis there is already a marked burden of disease in early adulthood. The data from the US, Sweden and Japan [19-21] show that the major burden of sugar induced caries increases markedly after 32 years of age [16].

Line 251 – ‘the final year’ is incorrect. I know that they did another assessment at age 38 and another is planned. That study is to continue into old age.  

**Response**  
Deleted the final year. See: “show that the major burden of sugar induced caries increases markedly after 32 years of age [16].”

Line 255 – comma after ‘life’ should not be there. Done  
Line 267 – comma needed after ‘Thus’. Done  
Line 270 – ‘non – milk’ should, of course, be ‘non-milk’! Done  
Line 271 – comma needed after ‘intakes’. Done  
Line 281 – delete ‘in 1982’ – it is redundant. Done  
Line 282 – ’12 year old’ should be ’12-year-old’ – it is a compound word. Done  
Line 283 – insert ‘a mean’ after ‘of’. Done  
Line 288 - ‘6-12 year olds’ should be ‘6-12-year-olds’. Done  
Line 289 – the ‘; i.e.’ is very clumsy – I would change it to ‘(that is, 50g/d [33]).’ Done  
Line 307 – ‘reliable’ is inappropriate – I assume you mean ‘valid’. Agree  
Line 309 – you cannot begin a sentence with ‘But’. Change to ‘However,’ or something. Do not begin a sentence with a conjunction. Done  
Line 337 – ‘Acknowledgments’ needs fixing. Check the spelling of ‘Fumiaka’ – I
recollect it as ‘Fumiako’. I may be wrong, but it is best to check… Have checked. We thank Dr Shinsho Fumiaki for help in translation of some papers from Japanese, and for obtaining permission to use one of the figures.

Line 346 – ectopic bracket… Removed.

Fig 2 – y axis label – should that be ‘increment’?

Response

The author used incidence so we are using that term. As mentioned earlier all the studies assessed incidence.

We hope that you are satisfied with our detailed responses. We attach the adapted paper.

Yours Sincerely,

Aubrey Sheiham

W. Philip T. James

The Editor,

22th May 2014
Dear Sir/Madam,

Re: MS: 7981649021258637 Research article The quantitative relationship between sugar intake and dental caries; the need for new criteria for developing goals for sugar intake Aubrey Sheiham and Philip T James BMC Public Health

With reference to your email dated 15th May 2014 here are our answers to your request for more details below.

a) Please provide more methodological detail in general so that the study can be replicated and specifically on the systematic review carried out.

Response: We did not carry out a systematic review. We state in the introduction that “Given that the recent systematic review by Moynihan and Kelly [3] showed a clear relation between sugars and caries, another systematic review of this issue is not warranted.”

We may have erroneously given the impression that we did a systematic review by stating in the first line of the Methods section that “Primary data were first obtained by a systematic review of nationally representative prevalence and incidence data on caries that contained sugar intakes specified either by dietary surveys or by national intake assessed from the UN Food and Agriculture Organisations Food Balance Sheet data derived in a standard way from industrial and other criteria specified by national governments.” We did not do a systematic review but reviewed databases.

To ensure that the major emphasis of the paper is seen appropriately we now propose to change the title of our submission to "A reappraisal of the quantitative relationship between sugar intake and dental caries; the need for new criteria for developing goals for sugar intake. Aubrey Sheiham and Philip T James. We have also deleted the words systematic review and rephrased the sentence as follows.

“Primary data were first obtained from nationally representative prevalence and incidence data on caries that contained sugar intakes specified either by dietary surveys or by national intake assessed from the UN Food and Agriculture Organisations Food Balance Sheet data derived in a standard way from industrial and other criteria specified by national governments.”

We consider that what we have written about our methods is sufficient for others to replicate what we have done. We go into considerable detail on the methods used apart from naming the experts we contacted. In the acknowledgements we now specify our gratitude to a specific individual who provided us with a particular type
of help. We refer to the papers from which we obtained the original Japanese data so that a reader could if they want to, get hold of the same data.

b) Please adhere to PRISMA guidelines and provide a checklist as an additional file.

**Response:** As we have not done any systematic reviews PRISMA guidelines are not needed.

c) Acknowledgements: By way of a section ‘Acknowledgements’, please acknowledge anyone who contributed towards the article by making substantial contributions to conception, design, acquisition of data, or analysis and interpretation of data, or who was involved in drafting the manuscript or revising it critically for important intellectual content, but who does not meet the criteria for authorship. Please also include the source(s) of funding for each author, and for the manuscript preparation. Authors must describe the role of the funding body, if any, in design, in the collection, analysis, and interpretation of data; in the writing of the manuscript; and in the decision to submit the manuscript for publication. Please also acknowledge anyone who contributed materials essential for the study. If a language editor has made significant revision of the manuscript, we recommend that you acknowledge the editor by name, where possible.

The role of a scientific (medical) writer must be included in the acknowledgements section, including their source(s) of funding. We suggest wording such as ‘We thank Jane Doe who provided medical writing services on behalf of XYZ Pharmaceuticals Ltd.’ Authors should obtain permission to acknowledge from all those mentioned in the Acknowledgements section.

**Response:** We acknowledge the help of Dr Fumiaki Shinsho who helped us with the translation of papers from Japanese and for obtaining permission to use one of the figures. We have his permission to acknowledge his help.

We have no sources of funding.

We wrote the article and no other writer or editor was used.

d) Conflicts of interest should be ‘Competing interest’.

**Response:** We have changed what we had to ‘Competing interest’. We have none.

We hope that you are satisfied with our responses and that our paper can start the
peer review process. We attach the adapted paper

Yours Sincerely,

Aubrey Sheiham

W. Philip T. James

4th April 2014

The Editor,
Dear Sir/Madam,

Intakes of dietary sugars have been linked to dental caries and a higher risk of some chronic diseases, such as obesity and diabetes.

Our paper is an important addition to the scientific literature because it re-examines the old information on the dose response relation between sugar and caries and finds the current conclusions fundamentally mistaken. The relationship is vital for policy makers as the current review of international WHO guidelines on acceptable levels of sugar intake is based on previous research that showed that the dose response relation was sigmoid and not linear with a 10% value as appropriate.

The original WHO value of 10% was generated in the 1980s and was based on the sugar/caries relationship, but no analysis of the lifetime burden of caries induced by sugar is available to see whether this 10% level is optimum and compatible with low levels of caries.

A recent extensive systematic review for the WHO’s Nutrition Guidance Expert Advisory Group (NUGAG), that we refer to in our paper, was conducted with input from ourselves on translated papers and new concepts concludes that there is a clear relationship between sugar intakes and dental carries but does not consider the interactions with fluoride at all. Indeed WHO analyses have always been based on children’s caries rates and therefore have neglected completely the greater burden in adults. Furthermore, that review, although helpful, was based on intervention trials on children and did not analyse the dose response relation nor the levels of caries in populations of all ages with very low levels of sugar intakes.

What our study now leads to a new set of conclusions:
a) There is a log-linear relationships to sugar intakes from 0%E to 10%E sugar
b) A 10%E sugar intake induces a costly burden of caries
c) A large burden of dental disease in adults does not occur if sugar intakes are limited to <3% energy intake
d) Adult as well as children’s caries burdens should define the new criteria for developing goals for sugar intake
e) Public health goals need to set sugar intakes ideally <3% with <5% as a pragmatic goal, even when fluoride is widely used.

We are therefore submitting the attached as a research article.

We suggest the following Academic Editors to handle our manuscript:

**Recommended reviewers:** Prof John Cummings, Emeritus Professor of Experimental Gastroenterology, Medical Research Institute Mailbox 3 Ninewells Hospital and Medical School Dundee DD1 9SY j.h.cummings@dundee.ac.uk
Professor Andrew J. Rugg-Gunn Emeritus Professor of Preventive Dentistry, WHO
Collaborating Centre for Nutrition and Oral Health, Newcastle University. andrew@rugg-gun.net

Professor Paula Moynihan WHO Collaborating Centre for Nutrition and Oral Health Centre for Oral Health Research Institute for Ageing and Health Newcastle University, UK P.J.Moynihan@ncl.ac.uk

We have no competing interest and we have not received any funding in relation to this publication.
The idea for the paper was conceived by Professor James. Professor Sheiham provided the scientific material and content for the paper and obtained permission for reproducing the graphs. Both authors drafted the paper.

Yours Sincerely,

Aubrey Sheiham

W. Philip T. James