Author's response to reviews

Title: Exposure of bakery and pastry apprentices to airborne flour dust using PM2.5 and PM10 personal samplers

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

We submit a revised version of our paper (Exposure of bakers and pastry apprentices to airborne flour dust) and we explain hereafter how we modified the text according to the reviewers’ comments. We thank the reviewers for their comments that gave us the opportunity to improve the manuscript. We hope it now meets the expectations of the journal. We did our best to correct idiomatic imperfections.

Answers to comments:

Reviewer: Denyse Gautrin

General

This is a large investigation to study exposure to airborne dust conducted among 286 apprentice bakers and pastry makers in Nancy in North Eastern France. The study involved the collaboration of several small craft bakeries and pastries. This work is an original contribution since dust concentrations in bakeries and pastries where apprentices work have not been published in such details. The results are clearly presented and the number of participants for each step of the study is adequately indicated. The authors provided a good description of the tasks performed by apprentices and of daily frequency of activities involving manipulation of flour. There are limitations in comparisons of results from the present study on exposure measurements with findings published in the literature. These are discussed satisfactorily by the authors.

Major Compulsory Revisions (that the author must respond to before a decision on publication can be reached)

1. The title of the manuscript is somewhat misleading giving the impression that specific aeroallergens typically found in bakeries were measured, in fact, as mentioned in the abstract, the dust particulate fractions PM$_{10}$ and PM$_{2.5}$ exposures were measured.
Answer: We changed the title of manuscript to “Exposure of bakery and pastry apprentices to airborne flour dust using PM_{2.5} and PM_{10} personal samplers”.

2. In the methods section, 1st paragraph, it is not clear if all participants (questionnaire only and exposure measurement study) were asked to sign a consent form when they volunteered to participate in the study.

Answer: French regulations do not require signed consents for studies that do not encompass clinical or biological data collection. Further, all our students were over 18 years old. If we had had younger students, parental consent would have been required. All volunteered for the study, however, otherwise it would have been impossible to do the measurements.

3. The text is well written and the tables are clearly presented (note that the order of tables needs to be set). Some editing, however, is needed to improve the manuscript.

Answer: We changed the order of tables at the end of the manuscript.

4. I found a discrepancy between the description of results page 7, second paragraph and data in Table 3 on daily frequency for the task ‘flour weighing for pastry production’. According to the table, more time is spent for this activity by First year students compared to older students; while the text suggests the contrary.

Answer: We are sorry for this discrepancy. The correct information was in the table. We changed the last sentence of the third paragraph in “Work environment” paragraph of the Results section. We added the number of respondents (now p.7).

5. To facilitate the reading of the description of Table 5, I suggest that the same sequence should be followed in the text and table for the PM size and for the time of the year. When summer and winter results are compared, it should be made clear if the two types of apprentices were grouped.

Answer: We modified the text (now p.7 and 8) accordingly to follow the same sequence of PM size and data as in Table 5. We now specified in the Methods (now p.6) and Results sections (now p.7 and 8) that seasonal exposure values were compared over the two groups of apprentices.

6. It should be indicated in the Methods section why both medians and arithmetic means are reported in the Results.

Answer: We now explain in the methods section (p 6) that exposures between apprentices groups were compared using non parametric tests but that, for the sake of comparability with literature data, we also provide average values. This was indeed confusing in the previous version and we hope it is now clearer.
Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct)

1. The tables need to be presented in sequence according to their Number

   Answer: We changed the order of tables according to their number.

2. In the first paragraph of the discussion, it is not clear if the authors are referring to their results or to those published in the literature, it should be specified. If results are from this study, they should be part of the results section.

   Answer: We changed the text accordingly to make clearer that we are referring to published results (first paragraph of discussion section, p. 8).

Reviewer: Andrew Brant

Reviewer's report:

General

This paper is quite well written and informs on a gap in the literature which is the exposures experienced by bakery and pastry apprentices. The data on winter and summer is interesting, as well as the detail on activities and personal exposures. The authors acknowledge problems with recruitment and sampling but this needs to be done in a clearer manner. In addition I think that its conclusions are rather strong ‘apprentices incur substantial exposure’ as this is not supported by the exposure levels, and the levels are lower than other papers finding (which the authors extensively review), and are below local exposure standards.

Answer: This an important issue and we do not pretend our data demonstrate that exposure levels exceed existing workplace standards. Are they safe levels, however? We do not answer this question, but we think these (and other) data may invite occupational health authorities to reassess existing limit values in the light of the high prevalence rates of respiratory conditions in these work categories. (note that our exposure study takes place within an epidemiological follow-up study whereby we assess incidence of airways inflammation along the 2 years of training). The results of this study will be available in 16 to 18 months.

Major Compulsory Revisions (that the author must respond to before a decision on publication can be reached)

1. I think the authors need to make it clearer the number of the base population that the apprentices are taken from so that representativeness can be better evaluated. How many apprentices are there in total, and how many bakeries do they represent. The authors only mention the total population in table 1 is 286, but this is of those that completed the questionnaire - how many were asked and how did the responders differ - if at all?
Answer: We changed table 1 to specify the number of subjects for each step of the study, among bakers and pastry apprentices (starting from the questionnaire study, and following with the exposure measurement study) (now p. 19).

A similar criticism is of the store sampled. The authors acknowledge that not all stores participated, and that they don't fully represent all apprentice stores. I suspect the authors have very good exposure information but I need confidence in this by knowing the representativeness of the stores. Do the authors have some details of the stores not sampled that can be added to the paper. The authors could expand on why first years samples were not included.

Answer: To answer this important question, we added a comment in the discussion section (second paragraph of discussion section, p 9) whereby we explain that we strived to assess the comparability of the questionnaire and the exposure measurements populations, using a series of data retrieved from the questionnaires (we provide 5 examples of such data in the text suggesting a fair similarity of the two groups).

As requested, we expanded the justification for not having included first year apprentices in the study in the Methods section (p.5), first paragraph of the “Field exposure measurements and determination of flour dust concentrations” sub-section.

2. Please explain why PM$_{2.5}$ and PM$_{10}$ are used and what impact this has on the findings

Answer: We expanded in the fifth paragraph of the Discussion section (now p 10.) our explanation on why we used PM$_{2.5}$ and PM$_{10}$ samplers. Our view is that PM$_{2.5}$ and “respirable” particles (1 - 4 µm) are essentially alike, while PM$_{10}$ and “thoracic” particles are similar, by definition. Much more discrepancies between published data may be caused by differences in the flour make up and granulometric profiles, which are never described.

In the discussion the authors have given reasons for the low response rate, such as not being concerned about health, fear of repraisals. This may be true but how is this supported in the study. If it is (reasonable) speculation then this should be made clear. In addition the authors I think have assumed that apprentices from working in poor conditions are less likely to enrol in the study - how do the authors know this, maybe it is the other way around that worse bakeries are more likely to enrol - this needs justification.

I think the geometric mean instead of the arithmetic mean should be used for the exposure samples

Answer: We have now specified in the text that this interpretation of the rather low response rate is based on our experience (second paragraph of discussion section, now p.8). Also, we have no facts to back our statement about employers in facilities with poorer work conditions being less likely to
participate to the study; it is based, however, on our discussions with the heads of the professional federations who supported our study. Hence, we added that this appreciation is based upon “our experience” (second paragraph of discussion section, now p.9).

About the statistical tests we used to compare exposure levels, see our answer to question 6 of reviewer 1.

Reviewer: Dick Heederik
Reviewer’s report:
General
This is an interesting study that covers a little white spot in the literature. It is unfortunate that only dust levels were measured and allergen levels were not assessed. This should certainly be done in the future, especially since enzyme levels for enzymes added as dough improver, can not be estimated by dust sampling because the levels are too low. Dust levels give a proxy of flour allergen levels and this should be mentioned.

Answer: We acknowledge that measurements of allergens would have been very valuable. Studies where allergens were measured in relation with dust levels are few (Lillienberg et al, 2000; Elms et al, 2001; Cullinan et al, 2001; Elms et al, 2003). Elms concludes his study saying that gravimetric measures of particles do not predict satisfactorily allergens concentrations, and recommends that the two be measured in parallel. Because of the complexity of these measurements, we decided not to add them to our study design.

The sampling equipment is somewhat unconventional because it is not in direct agreement of inhalable dust sampling as done in all earlier large scale published surveys from the UK, Belgium and the Netherlands. This should be discussed explicitly in the discussion section. Table 1 and 2 are not really necessary and the information from these tables can be included in the text.

Answer: We answered this question raised by reviewer 2 (question 2).

Regarding the tables, the other reviewers expected more details about the selection process and consequently we expanded table 1. Table 2 is informative, in our opinion, since no data is currently available on this apprentices’ population.

Because the number of measurements varies between Summer and Winter, artefacts might occur. One way is to limit the table only to truly parallel samples, the other way is to do a mixed analysis of variance (see for instance the recent paper by Meijster et al in the annals of occupational hygiene with job title in the model.

Answer: We agree that paired tests are appropriate to compare seasonal values. As now explained more clearly in the results section (p 7 and 8, first paragraph of “Personal exposure measurements”) statistical significance was based on such tests. Now, table 5 describes exposure values from the total study population and we did not want to discard data that, as one can easily imagine, were difficult to collect.

It would also be relevant to include more descriptive information about tasks and time spent on tasks. It seems that the levels these young people are exposed to do not differ strongly from bakers. The only difference might be the time they work or are exposed.

Answer: We are currently preparing another paper whose focus will be on the time variability of exposure levels. So, that we do not wish to expand in the present paper on these time related issues.
The statements about exposure levels in relation to TLVs might be misinterpreted by some readers. A TLV should never be exceeded, so that fact that the average exposure is close to the TLV point to a serious situation. The authors should stress this more carefully.

Answer: We agree and we added a comment on this finding in the discussion section (p12, first paragraph of page, eighth paragraph of discussion section).

I would shorten the section on health effects. But when these are introduced I would refer to some of the exposure response studies mainly from Scandinavia (Brisman), the UK (Cullinan) and the Netherlands (Houba or Heederik).

Answer: We added these different authors in the health effects section (p. 11, seventh paragraph of discussion section).

I also advise to refer especially to more recent and larger scale measurement series in bakeries from the UK and the Netherlands. For some of the smaller studies the sample of bakeries is not so well described and it is doubtful if the sample is representative (Vanhanen et al study) or the study consists of a mixture of short term and full shift measurements (Burdorf). I also suggest that only peer review papers should be cited or reports from government bodies, but no thesis (Jeffrey).

Answer: As requested, we added more recent papers and discarded Jeffrey and an older reference (Vanhanen et al) (p 3. second paragraph of background).

The number of citations in the introduction, especially to old references, can be limited by referring to review papers.

Answer: We removed the old references.