Author's response to reviews

Title: Easier said than done: applying the Ecohealth principles to a study of heavy metals exposure among indigenous communities of the Peruvian Amazon

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Version: 4 Date: 12 January 2013

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Date: 06-01-2012

Dear Editor
In this letter, you will find our response to the reviewer’s comments and a point-by-point explanation (in cursive) of the changes that the manuscript underwent.

REVIEWERS’ COMMENTS TO AUTHOR

Reviewer: 1
Reviewer: Sandra S Hacon
Reviewer's report:

I) Major Compulsory Revisions

1) It is a long narrative of a case report on heavy metals among indigenous communities of the Peruvian Amazon (28 pages). The manuscript emphasizes the epidemiological study among the Corrientes communities; however it is not clear how the study was carried out using Ecohealth approach.

We have now clarified that the participatory nature of the research process implied the use of certain principles which have been taken as a basis of the Ecohealth approach.

2) The authors could make this text with a maximum of 15 pages. This manuscript is very tiring to read.

We have reduced the text to 20 pages.

3) The title of the manuscript does not reflect its content.

We have modified the title to make it consistent with the content.

4) The methodology used in various steps of this study is not clear. The item method does not present a clear way as the steps of the study were developed.

In this paper, our focus is not on the methods applied in the epidemiological studies, but on the description and discussion of the participatory process and the challenges faced.
5) In item results and discussion is presented the research process that should be in methodology.
We believe that in this case, it is difficult to apply the classical structure: Background, Methods, Results and Discussion and Conclusions. As this manuscript would be considered a correspondence letter, we would like to propose a different structure formed by the sections: Background, Research process, Challenges and Conclusions.

6) The results and discussion are a historical context of the conflicts and challenges during the process for participatory research on the impact of heavy metals for among indigenous communities. However, some results are not clear how they were reached.
We think that the new proposed structure would help to prevent confusion regarding the sections where specific information should be placed in.

II) Minor Essential Revisions

- Page 17, there is no Figure 1.
We have deleted Figure 1.

Level of interest: An article of limited interest
Quality of written English: Acceptable
Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:

- Rejected because the manuscript needs a deep revision clarifying step by step how the Ecohealth approach was appropriate applied?
We have now clarified that the research process involved the use of certain principles, which have been recognized as Ecohealth approach principles. However, no strict set of steps was followed in the process. As Charron, in her publication “Ecohealth research in practice” (2012) has mentioned, there is no single “right” way to do Ecohealth research. Many Ecohealth case studies have described how they used many principles of Ecohealth research in their own way, without sharing necessarily a common methodology. However, all of them have involved communities and other stakeholders in executing the research, as in the case of our study.

- Also it is necessary to reduce the manuscript and to put essential information.
The manuscript has been reduced as suggested.
**Review 2**  
**Reviewer:** Francoise Barten  

**Reviewer's report:**  
This article examines the application of Ecohealth principles in practice: an epidemiological study of heavy metals exposure among indigenous communities of the Peruvian Amazon - in the context of "unprecedented" exploration and development of oil activity and increasing concern and popular mobilization in regards to the existing environmental and potential health impacts.

The authors first contextualize the research, briefly introduce the Ecohealth principles and explain the rationale for selecting this framework in an epidemiological study conducted in 2008 to clarify the connection between the exposure to heavy metals (lead and cadmium) and oil activity.

It is worth noting that previous studies had associated elevated levels of lead and cadmium to oil-activity related pollution. The new study (2008) however, suggested that oil contamination was not a relevant source for the high blood lead levels found in the group of 0 to 17 years, in both exposed and non-exposed communities. Older age, male gender and mother’s BLLs were identified as risk factors.

- **It is worth noting that samples of dust, fish and other food were not examined.**
  
  *We have clarified that those samples were actually examined*

This paper focuses on the research process. It critically examines the collaborative partnership that was established engaging a variety of actors with different values, interests, knowledge, competences, power. The authors then reflect on the main challenges, the implications and attempted strategies for resolution.

The paper is without doubt of great interest to authors with similar research interests, in particular in methods for enhancing knowledge translation into policy and practice. It is well written, the flow of the argument is logical and the dilemmas for researchers are clear.

However, I also missed critical information in order to fully comprehend the process- and I herewith recommend the authors to clarify these aspects.

Considering the unprecedented exploration and development of oil activity in the Amazon region - the entirely preventable nature of this public health problem and the irreversible long-term health impact of environmental lead exposure on children, it appears that raising awareness, national leadership and ownership are critically important.
- The principal investigators represent/belong to a foreign university. Would it have made a difference if a Peruvian university ie the national health institute and the national Ministry of Health had participated in the partnership? Why was there no involvement of local epidemiologists? What is the relevance of ownership in this particular? To what extent has this influenced the research process and the challenges that were faced?

In the revised version, we have clarified that the delegates from the Regional Directorate of health, who formed part of the research partnership, were epidemiologists/worked in Epidemiology-related divisions/units. In addition, although it has not been mentioned in the paper (we did not consider this information as very important), the approval of the study protocol by DIRESA was advised by evaluators from various national health institutions such as the Center of Occupational and Environmental Health (CENOPAS) and the General Directorate of Epidemiology (Dirección General de Epidemiología del Peru).

In that vein, although the leadership of the study’s scientific component had been assigned to Umea University, the decisions were taken after a democratic interchange of ideas, priorities and concerns of the stakeholders, followed by a consensus of the research partnership. Therefore, the ownership of the project was shared by the three parties. This was beneficial to ensure a legitimate process but also implied challenges when trying to harmonize competing agendas, overcome problems of leadership and representation, demanded more time, resources and efforts.

- Secondly, research funding is another important issue. It is not clear how decisions were taken and which actor controlled the research-funding or maintained the relation with the funder. Power asymmetries in this regards tend to be important.

In the revised version we have clarified that the indigenous federation controlled the funding. Though there were some barriers because of this condition, we have decided not to include/discuss/elaborate further this aspect in the paper.

Finally, the study focused in particular on lead and cadmium exposure. It could be debated if "safe" blood lead levels exist and to what extent the reference limit for blood lead levels is sufficiently safe in this population, exposed to variety of other health hazards - that produce synergy and interconnect in terms of health effects. As the authors describe, the indigenous communities are concerned about the wider and more profound long-term impact on their habitat.

Briefly, in the section “Communicating complex and unexpected findings” we have mentioned that one of the challenges when communicating results was the lack of evidence to determine a safe/not harmful level for lead and cadmium. Regarding joint effects
between lead and cadmium and other health hazards, we consider there is not enough information available to elaborate this issue in the present paper.

**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Needs some language corrections before being published

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**
I have no competing interests in relation to this paper.
However, I wish to notify that I have acted as examiner of a PhD thesis (promotor Dr M San Sebastian) at UMEA university