Response to Reviewers' comments

on the manuscript n°:2021-37

Risk perception of local stakeholders on natural hazards: implications for theory and practice

Revised in order to be considered for publication in

Natural Hazards and Earth System Science (NHESS)

We thank the reviewers and the Editor for their constructive comments and suggestions. We believe that after this second stage of review the current version of the manuscript has greatly improved. Hereafter, reviewers' comments with our detailed response.

Reviewer #1

The authors have addressed most of mine and the other reviewers' comments, but it seems that my suggestion to conduct a more in-depth statistical analysis has been over-interpreted. The authors have now added a large amount of statistical analyses, mixing parametric with non-parametric statistical approaches. It is indeed true that there is a debate on which one is the appropriate approach to analyse ordinal data. However, I believe that in the presence of such debate, the authors should take a stance and choose the approach they deem more appropriate for their data and present their arguments for such choice. My opinion in this regard is that this approach should be non-parametric, as ordinal data can often have error structures that are not normally distributed, and thus violate common assumptions of many parametric approaches. The authors' themselves in line 471 state "Since we have an ordered variable, and the distances between the categories are not the same […]". In line 436 the authors state that "Kruskal-Wallis rank sum test is more powerful because it uses the mean of the rank to assess if there are differences in the responses of different groups (Agresti 2002, Magnifiaco, 2016), not requesting further assumption about the distribution of the data, although the test is fit for small samples in which there are not normal distributions". If the authors think that this test is better than the one previously presented, why then not just using this one? It would slim down the analysis (e.g. the analysis would then consist of Chi-sq tests + Kruskal-Wallis test + CA*). Anything between lines 482-503 and related results can then be removed (together with Tables A4, A5, A8).

Response: We thank the reviewer for the comment. As suggested, we have removed the parametric statistics (lines 313-315 and 386-407 in the tracked manuscript), further justifying the choice of the use of the solely non-parametric analysis.

Moreover, the basic concepts and principles of statistical analysis (such as those behind hypothesis testing) do not need to be presented in a research paper, as the reader is expected to understand the basics behind statistical testing (i.e lines 426-435 and 438-440 can be removed). The statistical methods

section should serve to name the tests used as well as any additional information useful for the reproducibility of this study. It is indeed not always necessary to explain in detail what a test does, unless the author argues for one test over the other (and thus needs to argument the "why" behind the choice).

Response: We have reviewed references from the literature, including those cited in the statistical part, and we found that when the statistical test are used to argue for certain conclusions, clearly stating the null hypothesis is done; that is why we had introduced this part, in order to be able to respond to the research question in a straightforward way; we reduced the statistical part to two pages from the original three pages and a quarter (lines 299-407 in the tracked document; lines 275-348 in the cleaned document).

I had previously recommended reconsidering the use of CA because there are, in my opinion, other more straightforward methods to show these difference (even by simply plotting the data). However, the choice in this sense falls on the authors.

Response: We agree that the elimination of CA was requested, but in the case of non-parametric statistics CA is the equivalent of ANOVA; that is why we decided to keep it. In this way we will have the full spectrum of statistical analysis.

Minor points:

- Unfortunately I forgot to mention this at the previous round, and I apologise for bringing this up only now, but naming the variables Q1, Q2, etc. makes it extremely hard to read the tables presented in the paper (as the reader has to always go back to the survey form). I recommend assigning a more descriptive name to the variables.

Response: Indeed, you are right. Unfortunately, it is also very hard to find type of coding that is why we added after the Q1-Qn coding in parentheses the text of the question. This is the only way in which we ca resolve this. While it will add some text it will make very easy for the reader to understand. The questions were already added in the Figures so this will be consistent across the article. In this way there is no need for the reader to scroll for the Appendix Table 1, and the codes Q1-Qn remain only as reference for that table and the other tables.

- Lines 395-398 could be removed as it's not relevant to the end of reproducibility of your results. It would be enough to write that the statistical analyses presented in this paper have been conducted using the software for statistical computing R.

Response: Indeed, Thank you! We have modified accordingly, and now the statistical part is reduced to only two pages of relevant information.

- Line 399: I would use "ongoing" instead of "never-ending", as it seems too strong.

Response: Indeed, Thank you! We have modified accordingly on line 303 in the tracked manuscript.

- Lines 410-411: I think this sentence is superfluous.

Response: Indeed, Thank you! We have modified accordingly in lines 314-315 of the tracked manuscript.

- Line 414: While I completely agree that plotting Likert-type scale like the authors did is one of the best ways to plot these data, I wouldn't consider it an analysis per se, but rather a data exploration (fundamental step before starting the actual data analysis).

Response: Indeed, but we want to keep it said because we listed it in the three steps of the statistical analysis of questionnaire data. Besides, another reviewer asked us for a full description of the statistical workflow and that is why we decided to include it.

- Lines 418-420: In light of what the authors write here, with which I agree, I would remove this sentence and the corresponding Tables A2 and A3. In my opinion, it doesn't add anything relevant to the analysis.

Response: Indeed, Thank you! We have modified accordingly in lines 411-413 of the tracked manuscript.

- Line 505: "selected questions", do the authors' mean the main questions relevant to the study?

Response: Indeed, Thank you! We have modified accordingly on line 423 of the tracked manuscript to "*for some relevant questions only*".

- Line 530: what are the age segments corresponding to "young", "mature" and "old"?

Response: Thank you! We have introduced the values in lines 443-444 of the tracked manuscript: "*Besides the stakeholder type, administrative unit, and floodplain vs. hilly area, the age category (young – 18-35 years, mature 36-55 years, old - >55 years), gender, and education were considered.*".

- Table 4 could be moved to supplementary

Response: Since we eliminated the parametric statistics, this part was also removed.

- Lines 512-514 sentence unclear (missing verb?)

Response: We have modified accordingly in lines 415-420 of the tracked manuscript: "*In Table 2, the Asymptotic Generalized Pearson Chi-Squared and Kruskal-Wallis rank sum tests results are shown for the question items. In Table A2 in Appendix A, the same are shown for stakeholder types, administrative units, and floodplain vs. hilly areas. It can be seen that for all the question items (Table 2), the null hypothesis is rejected, and there is association present, at least one sample being dominant, thus the response to RQ1 is affirmative. For some questions in the case of stakeholder types and administrative units, the null hypothesis is rejected, while for flood vs. hilly the null hypothesis is rejected for the majority of questions (Table A2 in Appendix A).*"

- Line 558: Figure 3 does not show drought

Response: Maybe it is an oversight from the reviewer. Figure 3 shows drought as follows:
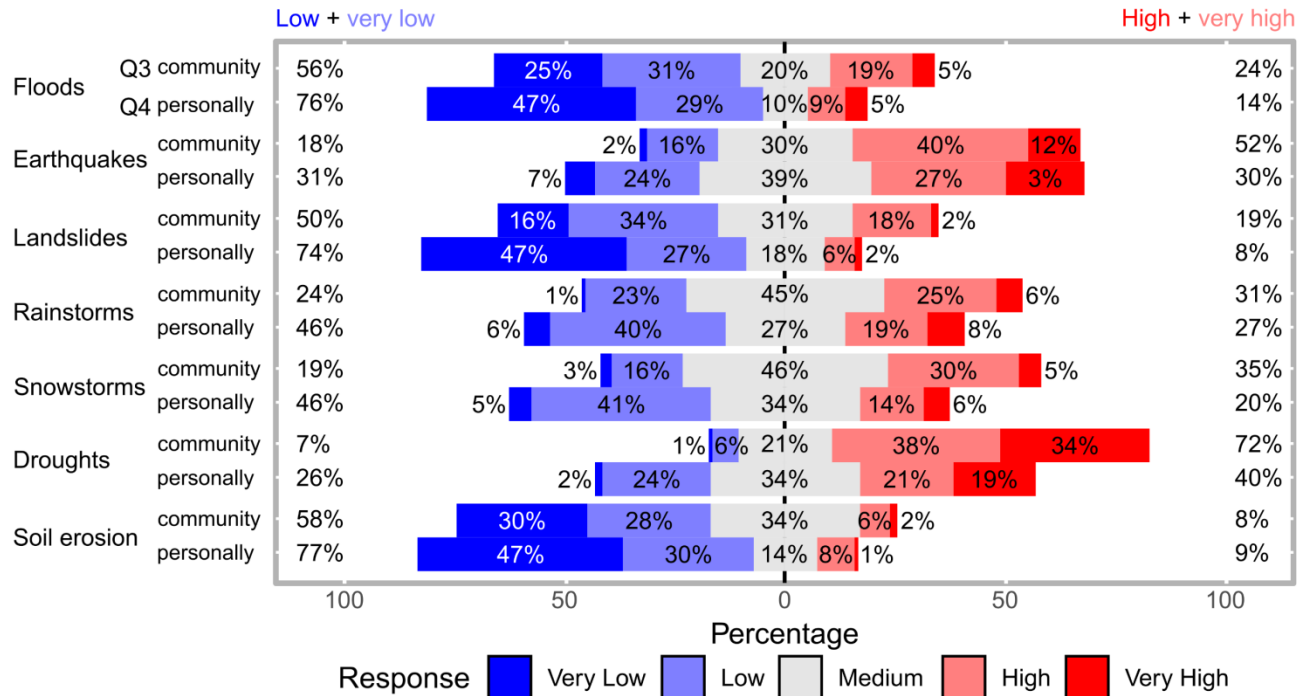
Figure 3. The Likert plot of the stakeholders' responses regarding the perceived threat of natural hazards for the community (Q3) and own person/household/income (Q4).

- Line 562: "There are ten years since I had serious problems every year" maybe should be "In the past ten years, I had serious problems every year". Maybe "achieved" should be "purchased"? Just checking because I am not aware what was meant in the original language

Response: The reviewer is right. We have checked and corrected on lines 473-475 of the tracked manuscript: *"In the past ten years, I had serious problems every year. I purchased a special car tanker to get water for livestock. And very little remains for vegetable crops. I get water from the reservoir (5 kilometers away), and I don't know what will happen when it disappears"*

- Line 578: "Stakeholders' " and not "stakeholders's"

Response: we have corrected in accordance on line 492 of the tracked manuscript.

- I noticed the authors changed school head into school director throughout the papers, but in the figures it still says school head. I would be consistent with school director throughout.

Response: We apologies for this oversight. We kept school director and made it consistent through the article. Figures 4, 5, 7, 8, 10 and 11 were also corrected from this point of view.

- Figure 8 caption: I would just keep "Stakeholders' past experience with natural hazards", as yes-no questions are not on a Likert scale

Response: That is a complete oversight of us. We have modified the caption, which is now: *"Stakeholders' past experiences of natural hazards."*.

- Line 773: there seem to be some issue with the numbering of figures. E.g. in page 35 it should be Fig. 10, but it's labelled as Fig. 2. Similar in page 36.

Response: We have corrected the numbering of the figures.

- Figure 9: I assume the blue and red colours for "Q6 damage" in Fig. 9 represents no and yes, respectively, but it should be stated in the caption.

Response: We have added this information in the caption as follows:.
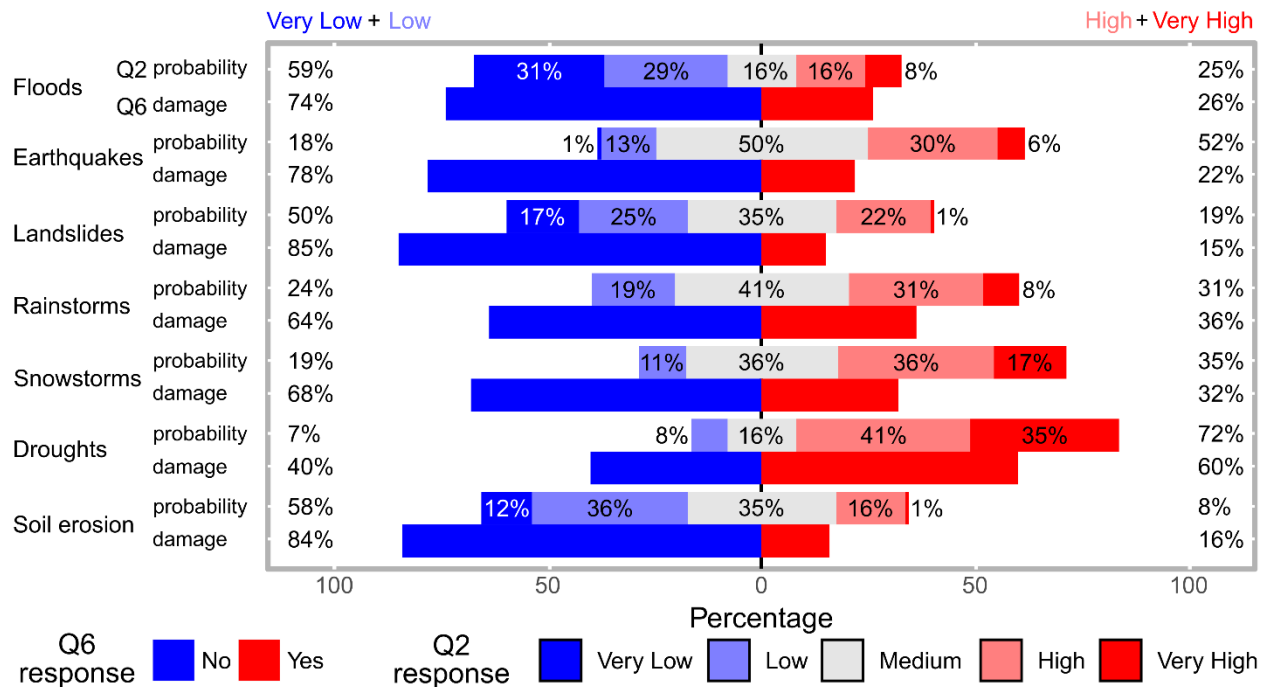
- Table A1: I think it would be good for the sake of consistency to assign a-h values for all the items, not only for the those in the first questions

Response: Indeed, we have added the a-h for all the questions in the table.

- Table A7: it's common practice to not write anything if a value it's not significant (i.e. no "ns" needed)

Response: Thank you! We have modified accordingly.

- Table A9: the authors don't mention the use of logistic regressions in the methods section, but their results are presented here. Results of a logistic regression are generally reported either as beta coefficient with related significance (p-value) or as odd ratio with related confidence interval. It is also not clear between which variables the regressions were run (but it seems between all of them) and the significance should be corrected for in case of multiple testing on the same variable.

Response: Since we eliminated the parametric statistics, this part was also removed.

- I would recommend an additional proofreading of the paper.

Response: The final version was proofreader by a native English speaker colleague who is acknowledge at the end of the paper.

Reviewer #3

Dear   authors,
The new text has greatly improved and you accepted quite all the reviewer's comments. Minor changes are necessary:

Response: We thank the reviewer for his/her valuable comments that greatly improved the manuscript.

Table 2 needs of a better columns division to separate the three different statistics results. At the moment two columns has the same column header (df) referring to different statistics.

Response: We added merged columns above the tests results to separate the two main areas of the table. We hope we made it clearer.

Captions of Table 2 and Table 3 should be improved.

Response: We have improved all captions, as suggested also by reviewer #1.

Figure 5 are wrongly cited in the text as Fig. 4.

Response: This is an oversight for us, due to the multiple versions of the manuscript. We have carefully checked the numbering of all figures and tables.

In the current version discussions and conclusions are in a unique paragraph. I don't know if it allowed, it depends by the editor decision, but in the current version, the conclusions are not very clearly reported.

Response: We have divided the two chapters for consistency with the other published papers in NHESS. The initial choice was made to maintain a limited number of words of our manuscript that we acknowledge being quite long.