

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC2
<https://doi.org/10.5194/nhess-2022-73-RC2>, 2022
© Author(s) 2022. This work is distributed under
the Creative Commons Attribution 4.0 License.

Comment on nhess-2022-73

Ana Acevedo (Referee)

Referee comment on "Seismic risk scenarios for the residential buildings in the Sabana Centro province in Colombia" by Dirsa Feliciano et al., Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2022-73-RC2>, 2022

The article addresses a relevant issue for a seismic country as Colombia; it gives relevant information about the seismic risk of the Sabana Centro providence. Nonetheless, there is no novelty on the article and key information is not given in the paper. Results from the selected scenarios indicate consequences of concern not well supported. My main concern regards the selected fragility curves: I find it complex to perform a risk analysis using fragility functions developed by different methodologies and as stated by the authors, with different limit states definitions. I believe this is one issue that requires additional explanation. For example, comparison between fragility functions is not presented. Do the set of curves behave as expected? Information given in Table 5 is not enough. The article should present figures that allows for a visually appreciation of the curves. A brief explanation of the methodologies uses for the curves' development should also be included, as well as an opinion about how reliable the curves are. How can the authors explain that the number of collapse buildings is almost three times the number of buildings with extensive damage? Furthermore, the number of collapse buildings exceeds the number of buildings in any other damage state.

Additional comments:

- Why do all the scenarios are crustal shallow events? In the article it is mentioned that for SA (1.0s) there is an important contribution of subduction events. As the number of scenarios is important (18) some of them should be subduction events.
- The authors mentioned the use of population census data to infer the number of buildings added to the original exposure model of SARA. It is not clear why the authors did not use the census data to directly obtain the number of buildings. The 2018 Census provides relevant information that can be used to have a more precise number of buildings.
- How was the building typology assigned to the added buildings to the original exposure model?

- Which replacement cost did the authors use? The authors only mention that the cost is assigned according to the socio-economic levels, but it is not clear which cost was used and how was it computed: cost per area? Cost per building? It is suggested to include the replacement cost in Colombian pesos as the exchange currency fluctuates.
- It is not clear how the information of the base exposure model (SARA) was complemented with the information of the 6249 surveys. Furthermore, all these buildings belong to the same municipality. A description of the buildings characteristics of each municipality should be included.
- The authors mention that 8.24% of the stock are wood buildings. How does this information compare to the Census data? (The Census provides information about building's wall material). In addition, the authors assigned a fragility function for wood buildings developed for Chilean buildings. Although the reference of the fragility functions used for wood has not yet been published, it is not clear that Colombian wood buildings have the same seismic behavior as Chilean wood buildings. A support for the use of Chilean wood fragility functions is needed.
- It is not clear why the authors use only two building heights: 1 and 4. Does the exposure model only comprise building with 1 and 4 stories? Or does the exposure model have buildings of several number of stories, but the authors decided to group them in just to building heights? Whatever the option, for a region where most of the buildings are low-rise buildings (as stated in the paper) a differentiation of number of stories is very important.
- Results should include the uncertainty as 1000 ground motion fields were generated and two GMPEs were used.
- The taxonomy MCF/DNO/H:1 is not correct as it is missing the lateral load resisting system.
- The taxonomy CR/LFINF/DUM/H:4 is used for buildings constructed using thin RC walls. This is not the original definition in the GEM taxonomy. It is suggested to use a different taxonomy.
- The taxonomy W/H1 is missing the information about the lateral load resisting system and the ductility level.
- It is not clear why the authors present mean values for the 18 seismic events. As each scenario has a different epicenter and different consequences mean values are not representative (results for each scenario should be presented by themselves). See Table 19 and Figures 10 and 13.
- The sentence of line 410 "One out of four buildings will experience extensive damage or collapse" is a strong conclusion that requires a big certainty to be written. I suggest the authors to revise the fragility curves of the masonry buildings (as most of the buildings are of this typology) and to compare the ground motion fields with the building damages to be sure that results are correct. Furthermore, as all the buildings form this typology are one-story buildings results should not be as bad as shown in the article.
- Line 440. The authors mention "the damage and losses estimates presented in this study should be considered as lower bound". See the previous comments.
- Figure 4. Add a color scale. It is difficult to read the percentage associate to each bin.
- Figure 9. It is suggested to include the earthquake epicenter as well as a figure with the ground motion field generated by the event.
- Figure 11. Expected losses including SVI should be greater than the expected losses without SVI. This is not shown at Chía and Sopó. For the ease of understanding it is suggested to use the same color scale in both maps of the figure.
- Figure 12. It is suggested to include the uncertainty in the figure.
- Table 2. Add the distance for the epicenter to the study area. Complement the information with a figure in which the epicenters are shown. As the events have an associated municipality, is the epicenter located at each municipality? How feasible is this? Results indicate important consequences that can be misinterpreted if the article does not mention the possibility that such events occur with epicenters in each municipality.
- Line 179. How does the "significant number of low-rise stiff buildings" relate to the

selected crustal events?