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Comment on nhess-2021-309

Anonymous Referee #2

Referee comment on "Modelling geographical and built-environment attributes as predictors of human vulnerability during tsunami evacuations: a multi-case-study and paths to improvement" by Jorge León et al., Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2021-309-RC2>, 2022

General comments

This paper analyzed the most relevant attributes of the geographical and built environments that can contribute to an effective tsunami evacuation. To do this, several coastal cities of Chile are studied and the descriptive and multivariate analysis is focused on the expected death ratio as an indicator of human vulnerability.

In general, the paper is well written, and methodology and results are clearly presented. However, introduction of 4 pages seems to be too large and makes it difficult to identify the main focus and scientific gap to be researched. It would be convenient to shorten the introduction, In addition, since the main topic is the human vulnerability, I suggest to shorten the paragraphs from lines 36 to 66, since specific explanation of fragility curves may not be necessary.

Some specific comments are the following

1.- figure 1 should be in methodology. A new figure 1 should show a map of South America, Chile and the topo-bathymetry of each location in order to have an idea of the morphology of each city.

2.- The Figure 1 (new figure 2 in section 2.1) should show the tsunami arrival time insted

of just the inundation area.

3.- section 2.2.1 should include a figure with example of simulation grids and all tsunami scenarios used in the analysis.

4.- Even though the resolution of the tsunami simulation is 4m, it would not be necessary to use the same resolution for the agent-based simulations. Since the inundation was recorded every 10 min (line 174), this measure can give you a necessary resolution for agent-based simulations. In fact, several resolutions may be used and similar results should be obtained.

5.- line 174 indicates that numerical model record the time series, however this results are not shown in the paper. The tsunami wave forms are also important to analyzed the tsunami arrival time and whether you captured the maximum inundation. Please add a figure to show those time series.

6.- line 172. Please clarify why only 45 min of elapsed time was used. It is well known that Talcahuano has some resonant effect and maximum tsunami inundation take place after several hours. In addition, it has been observed that the second or third wave are usually the largest one.

7.- line 322. Only 0.74% of cells in Talcahuano show to have elevated dead ratio. It is not unexpected since the inundation given in figure 1 is not that large. What would be the result if you analyze the maximum tsunami inundation insted of just 45 min?

8.- line 340. I understand that from a evacuation point of view you are interested in the first tsunami front. This may explain why you used only 45 min. However, in 45 min, some areas may have 2 or 3 tsunami waves, while Talcahuano would have only one. It would be necessary to use the same criterion for all locations.

9.- lines 346. It is observed that average number of casualties would occur with in 300 m from coastline. It would be interesting to analyse the effect of distant to trench, due to the fact that this variable affect tsunami propagation and subsequently the tsunami arrival time. Therefore, cities in northern Chile would experience larger number of tsunami-caused dehts than cities in central or southern Chile. Is that correct?

10.- line 399 indicates that maximum flood was analysed, however, with 45 min of simulation some cities may not reach the maximum inundation. As indicated in comment 5, Please add a figure of tsunami waveforms in the results section in order to show that maximum tsunami flood was analyzed.

