

June 12, 2020

Authors' response to Referee 2

We would like to thank Referee 2 for the exceptionally constructive feedback. We found the comments and suggestions offered by the referee very helpful and we appreciate the opportunity to revise key aspects of the article. We have made all of the changes suggested by the referee, and we believe that the revisions create a stronger and clearer paper.

Referee comment: Earthquake Hazard in Jerusalem

Section 2.3 does not present the state-of-the-art knowledge and understandings regarding earthquake hazards and damage in Jerusalem. For example, Avni (1999) presented detailed lists and reports of what had happened in Jerusalem during the 1927 earthquake; Salamon et al. (2010) conducted earthquake hazard evaluation for Jerusalem; Zohar et al. (2017) presented updated list of earthquakes and the damage they cause in Israel, including in Jerusalem. With this respect, Section 2.3 and Table 1 should be revised thoroughly.

Authors' response:

The detailed information of Avni, 1999 (written in Hebrew) was translated and summarized in Hough & Avni (2011) which we cited. Following the referees' suggestions, we use some of the detailed information from Avni (1999) together with the work of Salamon et al. (2010). The figures were updated using the recommended articles:

Figure 1 - instrumental earthquakes (>3M) were added (Fig. 1b); historical earthquakes are presented in Fig. 1a. Moreover, in Fig. 1b the dominant faults are marked, and settlements with ultra-orthodox residents are presented.

Figure 2 - map of Jerusalem with ultra-orthodox neighborhoods. Calculated seismic intensities (Avni, 1999) and zone of ground amplification (Salamon et al., 2010) are presented. Instrumental earthquakes >2M in Jerusalem are also presented.

Please view the figures at the end of this letter.

Referee comment: Survey

- Lines 256-7: "We then created a shortened version of the questionnaire to spread via an online form." However, in lines 371-2 it is said: "Most people do not own a television at home, and many do not have access to the internet or the radio". The reader may understand that those who replied online do not represent that group?
- Likewise, there is a need to show that the group of interviewees (228 responses) does represent the ultra-orthodox group (one million), so that the results of this study can be generalized and represent the group.

Authors' response:

- Regarding internet access, 48% of the respondents had no smartphone for religious reasons. However, 32% of non-smartphone owners answered the online form. This implies that many ultra-orthodox people have, albeit limited, internet access and are also represented in the online form. This information was added to the quantitative findings.

It should be noted that the limited access to the internet was one of the considerations for choosing in-person interviews for the majority of the respondents.

- In this research we used non-probability sampling that may not represent the entire ultra-orthodox population in Israel. There were only 288 respondents, there was an over-representation of men, the average age was young, and the great majority of respondents lived in Jerusalem and its surrounding areas. However, in our opinion, there are also considerable advantages to the sample that we chose. Firstly, the in-person interview surveys were conducted by ultra-orthodox or orthodox surveyors, enabling us to reach out to ultra-orthodox people who would probably refuse to respond to a telephone survey from an academic institution. A telephone survey which is faster and simpler might involve a considerable bias when it comes to the ultra-orthodox public. Secondly, the survey conducted in face-to-face interviews allowed a very long and detailed questionnaire to be answered, it allowed elaboration on questions and answers, it ensured that questions and respondents were understood, and it avoided offhand answers. None of this happens in a telephone or internet survey. Thirdly, focusing on particular communities, like ultra-orthodox communities in Jerusalem and its surrounding areas, allows a deep understanding of their needs and challenges and enables possibility of working with them over time. For example, it allows efficient training in these communities, like the training that dozens of our ultra-orthodox students currently lead in several ultra-orthodox communities in Jerusalem, after we had trained these students. Lastly, the young people that were interviewed are, or will soon become parents of children. We have seen from the literature that children's education is one of the most impactful tools in earthquake preparedness. From this point of view, we also wanted to co-opt them.

Referee comment: Results (general comment)

Overall, the raw data is not presented and the little that is shown does not allow the reader to follow and repeat the results and the final conclusions. The raw data should be presented in full, in tables and diagrams.

Author response:

Please see the two subsequent responses below.

Referee comment: Quantitative findings

Quantitative analysis:

1. There is a need to present the online questionnaire in full, maybe as an appendix.
2. Please present the demography of those who responded and filled the questionnaire, i.e. the information relevant to this study such as age, gender, income, education, area of living, social subgroup, etc. This of course should be kept within the confidentiality and anonymity promised to the reviewees, but still allow sufficient transparency of the database. Section 4.1.1 is not enough.
3. Please report how many forms were distributed against how many were replied and filled.
4. The findings from the questionnaires should also be presented in full as a background for the analysis of the results and the discussion.

5. It is not possible to evaluate how much the level of knowledge and awareness of the ultra-orthodox group differs from the ‘reference standard’ of Israel. There is a need to present the ‘common’ level of knowledge in Israel, and by comparison, show the difference (sections 4.1.2, 4.1.3).

Authors’ response:

We thank the referee for this helpful comment; we have added all that was recommended.

We included diagrams to illustrate the main findings, e.g., we added a diagram to summarize the level of belief of the ultra-orthodox people regarding the occurrence of a disastrous earthquake in the near future (please see Figure 3 at the end of this letter).

We have updated the demographics of the respondents (age, gender, marital status, income, education, area of living, social subgroup and type of phone they own). We also added data regarding the level of preparedness of the community. Furthermore, following the referee’s advice, we added the questionnaire and a table of the full findings as an appendix.

The response rate was around 90% for the in-person interviews. We do not know the response rate to the online questionnaire since we did not control its distribution. We added this information to the manuscript.

In the discussion, we compared the level of knowledge and readiness to prepare for an earthquake of the ultra-orthodox population to that of the general Israeli public, using the findings of Ya’ar et al. (2015) regarding the Israeli population (please see Figure 4 at the end of this letter).

Referee comment: Qualitative findings

1. Even though the interviews were open, there is a need to show the main leading issues and questions, as well as the answers, at least in a schematic way. Otherwise, there is no way to infer and conclude the systematic attitude or approach of the examined population.
2. The demography of those who participated in the open interview should also be presented. Which segment of the ultra-orthodox group do they belong to? Does this segment represent the entire ultra-orthodox group?
3. Please note how many people were approached against how many were interviewed.

Some sections or paragraphs seem to belong to the Introduction rather than to the results, e.g. lines 382-390, 402-404. In any case, such facts or statements (e.g. lines 389– 90: “. . . most ultra-orthodox schools still do not allow military personnel to conduct trainings”) should be supported by a proper source. Sometimes it is not clear whether the given statement refers to a direct outcome of this study? For example, lines 395- 398 regarding the “Low Socioeconomic Status”. Lines 442 – 444: belong to technology section in lines 481?

Authors’ response:

Regarding stakeholders:

1. We enclosed the interview guide, which was written to help interviewers frame the interviews and keep them on track, as an appendix. The answers were analyzed thematically and are summarized in clear and straightforward

subsections. Also, they are concluded schematically in the revised SWOT analysis and in points in the conclusion section.

2. The interviewees consisted of 16 relevant national-level policy and decision makers, nine rescue personnel and five religious leaders and key figures in the ultra-orthodox community. Of the interviewees, 17 described themselves as ultra-orthodox but did not highlight which exact community they were affiliated with; the rest were secular or religious but not ultra-orthodox. We added this information to the manuscript.
3. We approached approximately 40 stakeholders, 30 of whom agreed to be interviewed (75% response rate).

All the information that is written in section 4.2 presents qualitative results that we deducted from the interviews with relevant stakeholders. Still, in order to make things clearer, we made the changes recommended by the referee.

- Lines 382-390: We added supporting sources regarding the work of the Home Front Command in the education system. We added quotes from interviewees affiliated with the Home Front Command and with the Ministry of Education supporting our statements:

Insularity of Educational Institutions. In Israel, the military-affiliated Home Front Command invests heavily in providing emergency training to children and youth through schools and other educational institutions (<https://www.oref.org.il/11016-he/Pakar.aspx>). We learned from our interviews with role holders from Home Front Command and from the Ministry of Education that many institutions in the ultra-orthodox sector do not allow the government or military to enter educational institutions to deliver training even on crucial issues such as emergency preparedness. This is a decisive factor that leaves the ultra-orthodox population less prepared for earthquakes. Gershon from the Home Front Command elaborated on the subject and said: “Everything with relation to the Israeli army, especially in our times, holds a lot of tension. It’s complex, very few institutions cooperate with us. The ultra-orthodox education system at large does not allow military elements to enter”. Though the Home Front Command has adapted its curriculum to the norms of ultra-orthodox society, most ultra-orthodox schools still do not allow military personnel to conduct training, and therefore the majority of the students do not receive any instruction. Moreover, the Home Front Command has prepared booklets with safety information for students, adapted according to ultra-orthodox norms. According to Ya’ir, a safety officer from the Ministry of Education, many schools will not use these booklets.

- Lines 402-404: The interviewees talked about certain characteristics of the ultra-orthodox community that may create a positive effect on the preparation phase and emergency phase of an earthquake. Lines 402-404 introduce this section.
- Lines 395-398: Quoted in this subsection are the words of the interviewees describing why the low socioeconomic status which characterizes the ultra-orthodox sector may hamper earthquake preparedness.

- In the subsection “Adapting Technologies” we recommended that state authorities change technologies to be religiously appropriate. In the subsection “Soliciting Support” we recommended approaching community leaders and receiving their support in all areas of disaster management, including developing various technologies. The example of sending text messages to call-only phones is not an appropriate technology adaption and therefore requires the support of community leaders. We feel like the right place for this example is in the subsection “Soliciting Support”.

Referee comment: Discussion and Conclusions

Section 5 is hard to follow. There are issues that belong to the introduction, discussion, conclusions and recommendations, and I got confused which is what. For example, the content in lines 491-495 sounds reasonable, but is it a result of this work or just ideas taken from the given references. Sometimes the phrasing seems to ‘hide’ the finding of this study, for example, lines 489-491: “Past research has much to say regarding how emergency preparedness among marginalized communities can be improved, including both conduct during emergencies as well as recovery efforts following disasters. Many of our findings support this literature.” I think that this should be rephrased the other way around: first state in your own words what you have found and then discuss whether it supports (or not. . .) past research and give the appropriate reference. The main understandings, outcomes and suggestions are scattered along the text and thus I would recommend splitting Section 5 into three: Discussion, Conclusions and Recommendations.

Conclusions

I recommend summarizing the actual findings of this work as independent statements, rather than mentioning that: “Many of our findings support this literature. . .”.

Recommendations

Although the recommendations (e.g. lines 549-55) are part of the conclusions, I suggest listing it also in bullets or in a table, so as the authorities, who would (or should) be interested to implement the outcomes of this work, get to the point simply and easily

Authors’ response:

We thank the referee for this helpful recommendation. As suggested, we split the section “Discussion and Conclusion” into three sections: “Discussion”, “Conclusion” and “Recommendations”. We thoroughly revised the discussion, stating our findings and then discussing whether they support past research. We reviewed the level of awareness and preparedness of the ultra-orthodox sector and compared the findings with the literature. We discussed the community’s unique characteristics and stated how they may increase preparedness or hamper it.

In the discussion, we brought up an interesting point regarding retrofitting: Half of our survey respondents indicated that they do not live in buildings that meet the legal safety standards despite the fact that some of their neighborhoods are in areas with increased ground shaking during an earthquake (Salamon et al., 2010) (Fig. 2). Alarming, none of our respondents recommended retrofitting, a crucial strategy for minimizing the harm caused by earthquakes (Bozorgnia and Bertero, 2004). Our interviews with relevant stakeholders further confirmed that very few ultra-orthodox people are interested in retrofitting. They explain that the

reasons for this include a lack of awareness regarding three factors: the potential impact of earthquakes, the significance of building conditions in reducing damage, and the government's willingness to support retrofitting. Additional reasons are the intangibility of the danger and the low economic status of ultra-orthodox society. These findings stand in agreement with Maldonado et al. (2016) and Lucini (2014), who found that minority groups show a low level of self-protection and preparedness, a low level of hazard knowledge and a low level of action during the emergency phase.

In the discussion, we compared the level of knowledge and awareness of the ultra-orthodox population to that of the general Israeli public as stated above.

Lastly, in the discussion we touched upon the fact that in this research we used non-probability sampling that may not represent the entire ultra-orthodox population in Israel.

The research findings are concluded in the "conclusion" section. Our research questions included three main themes: the actual state of earthquake preparedness in the ultra-orthodox sector, characteristics that may hinder or promote preparedness, and ways of improving preparedness. The findings from the first two questions are summarized in a revised SWOT analysis that we further developed. The findings from the third question are summarized in bullets within this section.

As suggested, we listed our recommendations in a separate section using a clear bullet format.

Referee comment: Discussion and Conclusions

Oversimplification of the situation? Lines 514-15 state that "Given that the ultra-orthodox constitute a religious minority in Israel, the state authorities' representation of these communities is minimal" The status of the ultra-orthodox minority in Israel is unique. On one hand, they are a significant part of the government, sometimes even the balancing power, and are able to achieve much influence, beyond their relative share in the population. On the other hand, they refrain from accepting the Israeli authorities as is, and adhere to their own community leaders. They seem to prefer to isolate themselves and maintain their own way of life. In that sense, once you conclude and recommend that (line 554-5): "In addition, community leaders should be asked to give their support before approaching the community they lead", it means (in the subtext) that the community leaders may share the responsibility for the ". . . low level of hazard knowledge and a high level of disbelief that a devastating earthquake would occur in their area in the near future." (lines 39-40). As a result, a possible recommendation could be that instead of authorizing ". . . local non-governmental organizations official responsibilities in the area of earthquake. . . " (line 553), the local community leaders should authorize the formal Israeli authorities the responsibilities in the area of earthquake. This is a very complex situation and it means that improving the level of knowledge and awareness in this minority group is not just a simple list of 'to do'.

Authors' response:

We appreciate the referee's criticism regarding the oversimplification of the situation. We deleted the cited sentence in lines 514-515 regarding the minimal representation of the ultra-orthodox communities in state authorities. In the revised manuscript, the presentation of the complex relationship between the state and the ultra-orthodox society is more subtle and nuanced. Indeed, as the referee points out, this relationship often includes a high level of suspicion by ultra-orthodox communities towards state institutions and authorities, as well as

these communities' preference to adhere to their own community leaders. Moreover, we agree with the referee that the local community leaders share the responsibility for the current low level of hazard knowledge. We now emphasize the urgent need to establish a reciprocal and continuing dialogue and collaboration between the relevant state institutions and ultra-orthodox community leaders. For this purpose, both parties should acknowledge the necessity to build trust and joint work networks to improve the level of preparedness. We demonstrate the required change by showing how dozens of our ultra-orthodox students currently serve as trainers and "ambassadors" in their own communities, providing culturally-adapted knowledge on earthquake preparedness and receiving the support of key actors in their ultra-orthodox communities. We hope that the revised manuscript better reflects the complex and entangled situation highlighted by the referee.

Referee comment: Referencing

Many statements sounds reasonable, however, they need to be supported by a reference or source of data, e.g. line 90; lines 209-210: "With regard to earthquake preparedness, most members of the Jewish ultra-orthodox society in Israel live in . . . buildings that do not meet the standards for earthquakes."

Authors' response:

We added supporting references to various statements and deleted some other statements. For example, for the statement in lines 209-210, we now provide the Central Bureau of Statistics' data regarding the density of the Jewish ultra-orthodox population (1.37 persons per room) in comparison to the Jewish secular population (0.72 persons per room), and we demonstrate that many ultra-orthodox neighborhoods, e.g. in Jerusalem and Bnei Brak, had been built before the current seismic building code was implemented.

Line 90, "marginalized social and cultural groups are more vulnerable to natural disasters than majority groups", has been removed from the revised literature review which now focuses more on religion and less on marginalization, following Referee 1's suggestion.

Referee comment: References not mentioned

Avni, R., 1999. The 1927 Jericho Earthquake, Comprehensive Macroseismic Analysis Based on Contemporary Sources. (PhD.). Ben Gurion University, Beer-Sheva. Salamon, A., Katz, O. and Crouvi, O. (2010). Zones of required investigation for earthquake-related hazards in Jerusalem. *Natural Hazards*, 53: 375-406. Zohar, M., Salamon, A. and Rubin, R., (2017). Earthquake damage history in Israel and its close surrounding - evaluation of spatial and temporal patterns. *Tectonophysics*, 696: 1-13.

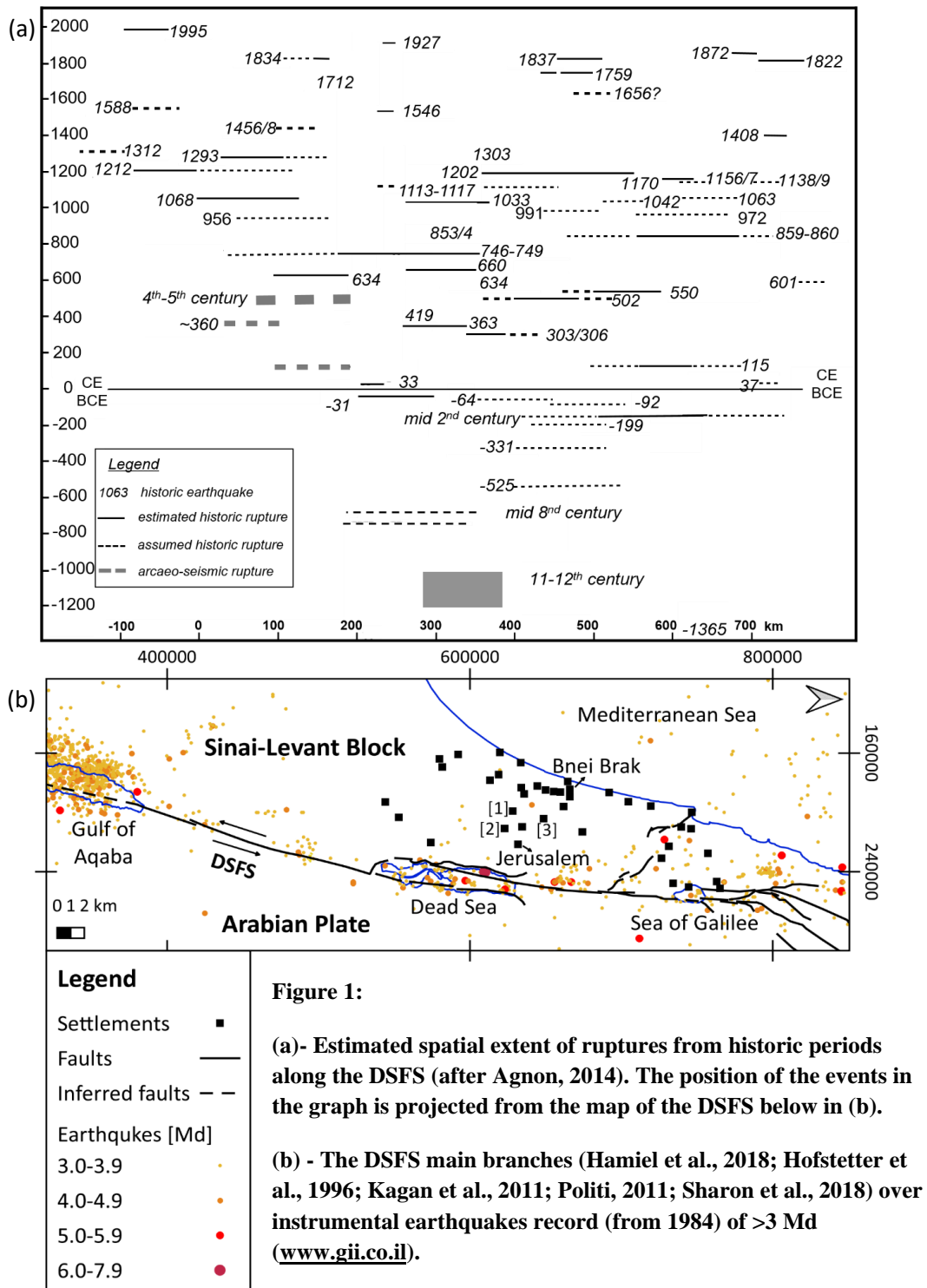
Authors' response:

We thank the referee for suggesting these references. The detailed information of Avni, 1999 (written in Hebrew) had been translated and summarized at our initiative in Hough & Avni (2011) which we cited. In the revision we use it together with the work of Salamon et al. (2010) and cite both in the references to the text and figures.

To conclude, we addressed all the issues raised by Referee 2. We would like to thank the referee again for the work invested in reviewing our manuscript. We truly believe that the review process substantially contributed to the article and we hope that the current version will be accepted to *Natural Hazards and Earth System Sciences*.

Sincerely,
The authors

Figures



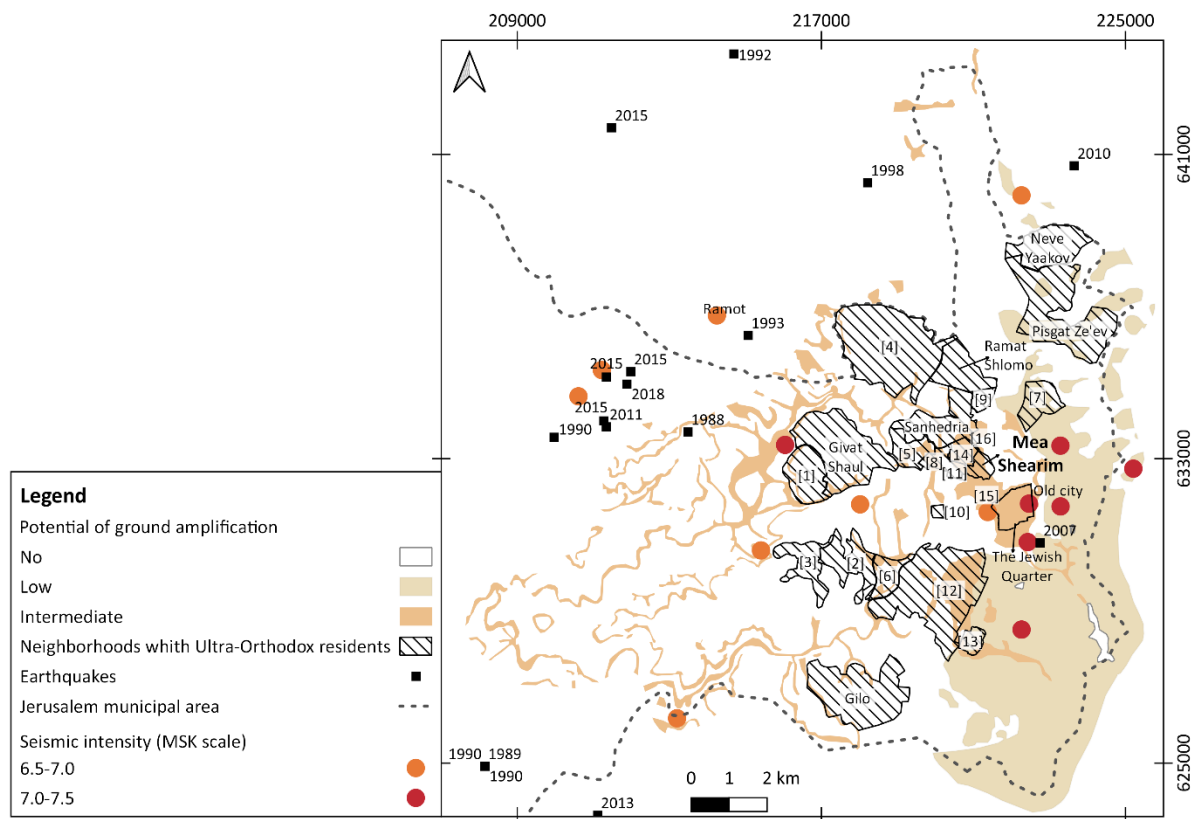


Figure 2:

Map of neighborhoods in Jerusalem with Ultra-Orthodox residents (modified after Community administrators Jerusalem map, 2009; Golan, 2020) over ground amplification map (Salamon et al., 2010).

[1] – Har Nof, [2] – Bait Vegan, [3] – Kiryat Hayovel, [4] – Ramot, [5] – Romema, [6] – Givat Mordechai, [7] – French Hill, [8] – Mekor Baruch, [9] – Ramat Eshkol, [10] – Sha'arei Hesed, [11] – Zikhron Moshe, [12] – Katamon and Katamonim, [13] – Arnona, [14] – Bukharim, [15] – Morasha, [16] – Shmuel HaNavi.

Mea Shearim, and the neighborhoods adjacent to it to the north are associated with the ultra-orthodox sector. They are in an area marked by increased ground shaking during an earthquake.

Instrumental earthquakes (from 1984) of <2 Md are presented by black rectangles together with the year of quaking (www.gii.co.il). Medvedev–Sponheuer–Karnik scale (MSK) intensity scale evaluates the severity of ground shaking in an area of earthquake occurrence; the mean seismic intensity in Jerusalem shows strong-to very strong shaking zones from the 1927 6.2 M Jericho earthquake (Avni, 1999).

Level of belief that a disastrous earthquake will occur in Israel/in your area in the next five years

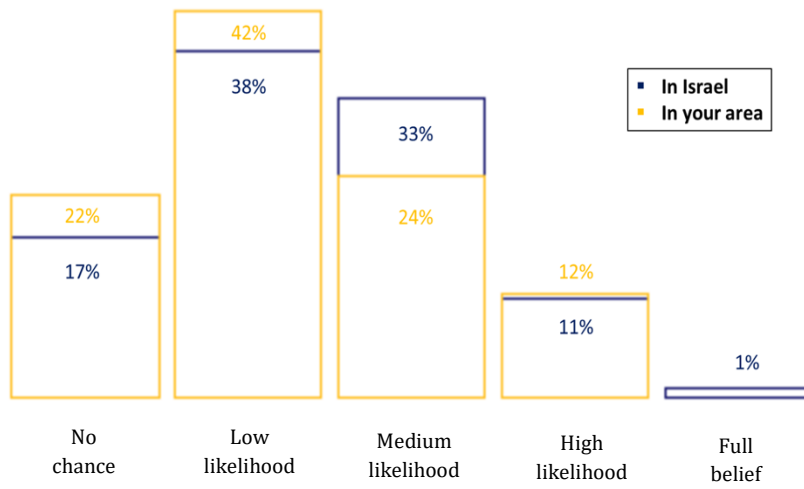


Figure 3: Level of belief that a disastrous earthquake will occur in Israel/in your area in the next five years.

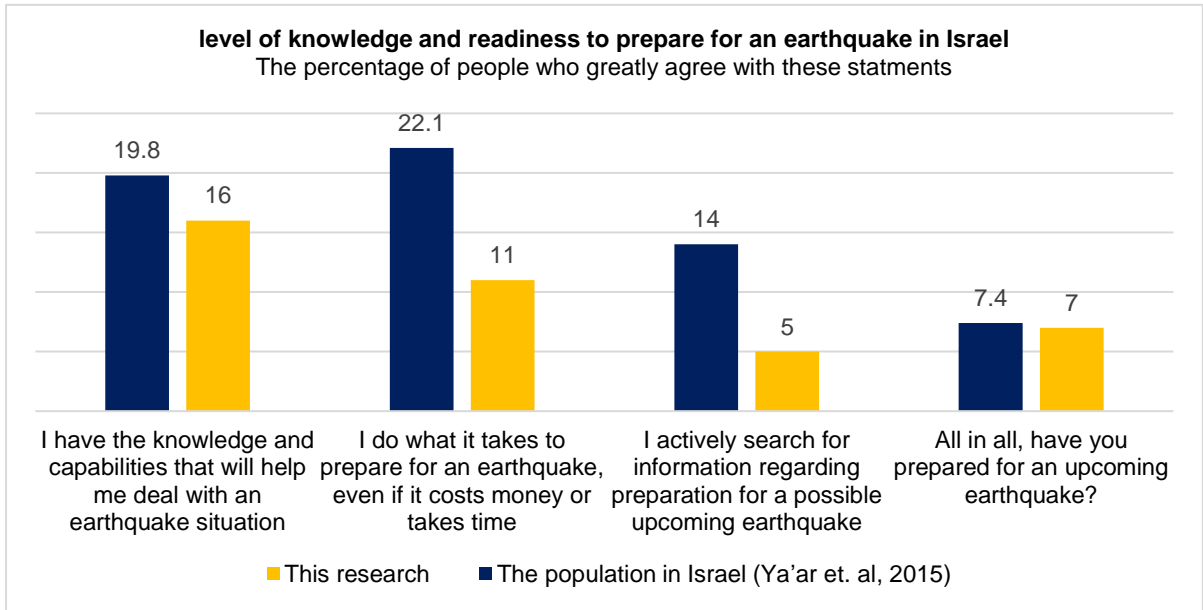


Figure 4:
Level of knowledge and readiness to prepare for an earthquake in Israel