Online Supplementary Appendix for User Acceptance and Perceptions of Earthquake Early Warning Systems as a Function of Information Type: The case of post-earthquake Nepal

A. Survey data collection and data

Following Gautam et al. (2020), we created a landing page on Facebook, where we included information about the research team and the project. The survey links themselves were disseminated through Meta advertisements (Zhang et al. 2020) without stratification quotas. During collection, respondents were allowed to come back to their survey link for a set amount of time if they did not complete it. A simple attention check was employed in which we asked respondents to choose the letter we picked in a multiple-choice format (e.g., Aronow et al. 2020), and observations that did not meet the criteria were discarded. The opportunity to participate in the draw, which was for a 200 NPR phone recharge card (around 1.50 USD) for 25 people, was not dependent on passing the attention check or finishing the survey, and the Qualtrics survey instrument used to collect information for the draw was separate from the survey instrument used for the actual data collection as accessed on the instrument's concluding Qualtrics page. The final sample is thus likely biased toward those who had internal motivations towards filling out the survey; however, this also means that our data are likely of decent quality. Indeed, around 50% of our final respondents filled out the open-ended question, many responses of which were thoughtful contributions to the data.

The measurements and the scale (five points) for the outcomes on desire for implementation and beliefs in the usefulness of the system were worded following previous studies on early warning systems (e.g., Becker et al. 2020; Dallo et al. 2022). Following the preanalysis plan, interest was coded as 1 was when a respondent chose 'Yes' or 'Ask me again at the end of the survey.' 'No' was coded as no interest (0). Skips were allowed, and they were coded as missing values since it is not possible to discern if the respondent read the question and was not interested or if the respondent skipped the question due to time without reading it.

As noted in the preanalysis plan, we aimed for a sample size of 2,000 in order to easily detect small effects and to be able to explore heterogeneity within the effect. However, we found during data collection that after one or two days of having a new advertisement deployed, a gap grew between the number of advertisement views and the amount of engagement in terms of links clicked. We attributed this to saturation in which the same pool of users was seeing the advertisement in the short time span. To address this, we varied location from within the Kathmandu Valley on the one hand, which holds a larger population due to the dense urban centers of Kathmandu, Lalitpur (also known as Patan), Bhaktapur, and Madhyapur Thimi, and the country at large on the other in terms of iterative advertisement deployment, which occurred approximately once a week. Indeed, the majority of our sample self-reported to be from the urban centers (61%), likely due to sheer population density as well as a likely larger population of educated, tech-savvy residents, and from the Kathmandu district in particular (36%). Other potential factors that might have contributed to a lower rate of respondents than we had intended could be the length of the consent form (especially for potential respondents who might have less exposure to surveys intended for research), the fact that the survey was led by a foreign researcher (though the authorship team also contains Nepal-based researchers), and/or concerns for internet safety/scam threats. We have no way of assessing these possibilities, however, since this is the first survey of its scope that we are aware of (i.e., without snowball sampling and/or without a smaller, targeted population) in Nepal. We ended the survey after around six to eight weeks to meet the time specified in our consent form for the phone card drawing, with a final survey sample size of 567.

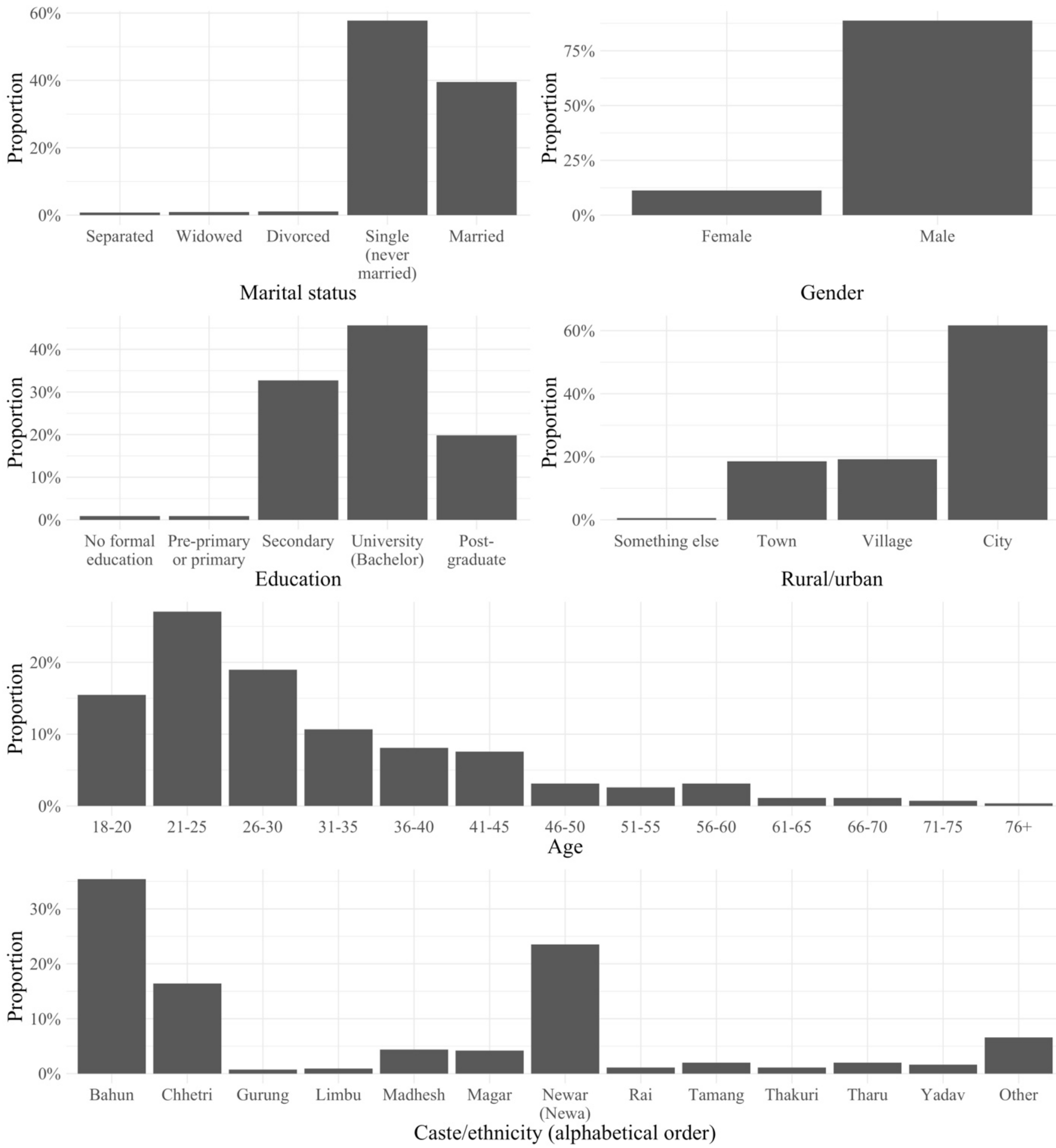
Due to the lower sample size and issues of power, we have forgone investigation into heterogeneity in the effects presented this paper. We hope to build on these insights in future research. In the final sample for this study, for the outcome of desire to implement, 127 observations were assigned to and completed for the control (~24% of completed observations), 141 for the technical information (T1) (~26%), 124 for the limitations (T2) (~23%), and 145 for the combined information (T3) (~27%). For the outcome of opinions on usefulness, 128 observations were assigned to and completed for the control (~24%), 139 for the technical information (T1) (~26%), 124 for the limitations (T2) (~23%), and 145 for the combined information (T3) (~27%). Finally, for the outcome on interest in learning more, 125 observations were assigned to and completed for the control (~24%), 137 for the technical information (T1) (~27%), 114 for the limitations (T2) (~22%), and 137 for the combined information (T3) (~27%). While there is some variation, they fall within an acceptable range of random assignment. A visualization of key demographics for the sample can be found in Figure A1.

Since our design included both confirmatory and exploratory components, we registered the use of a two-tailed test in the case that our effects went contrary to our model. Indeed, this was the case for one effect—the effect of the combined limitations and technical information on desire for implementation.

B. Survey instrument, descriptive data visualization, and associational regressions

The vignettes for the experiment can be found in Table B1. (The Nepali can be found in Appendix E.) Other questions included those that gathered demographic information, including gender (0 = male, 1 = female or other), caste/ethnicity (Brahmin/Bahun and Chhetri = 0, Newar = 1, others = 2), marital status (single/separated/widowed = 0, married = 1), education (no formal education = 0, pre-primary and primary = 1, secondary = 2, university = 3, post-graduate = 4), age (18-25 = 0, 26-35 = 1, 36-45 = 2, 46-55 = 3, 56-65 = 4, >65 = 5), and rural/urban (city = 0, town = 1, village = 2) area of residence. A number of questions on past experiences with earthquakes, knowledge of EEWS, and opinions and preferences for EEWS were also included (Table B2). Visualization of the data for the background of respondents in terms of experiences with earthquakes, anxiety, and knowledge of EEWS can be found in Figure B1. Visualization of preferences for an EEWS app can be found in Figure B2. Visualization of projected behavior can be found in Figure B3. The Nepali version of the questions can be found in Appendix E.

Figure A1. Visualization for the demographic distributions in the sample



Note: Proportions are of the total without skips or missing values. Selection is mutually exclusive.

Table B1. Vignettes to measure the effect of technical information and limitations of EEWS

Control	An Earthquake Early Warning System is a system put in place in areas that have ongoing risk for earthquakes. These systems help alert residents of ground shaking when earthquakes occur. Many earthquakes happen in Nepal, like the recent earthquake in 2015 called the Gorkha earthquake. An earthquake early warning system is thus a warning system for earthquakes for places like Nepal. It is meant to warn residents that live in the country that ground shaking might be coming due to an earthquake.
T1: Technical information	An Earthquake Early Warning System detects earthquakes to warn residents before shaking is felt. In an earthquake, a rupturing fault generates two different types of waves: one is the Primary wave (‘P-wave’) and another is the Secondary wave (‘S-wave’). The P-wave moves very fast and is first to arrive, but the damage is primarily caused by the S-waves, which move slower. Many Earthquake Early Warning Systems operate by detecting the P-wave with complex sensors that are buried in the ground. When the sensors detect P-waves that indicate potential ground shaking due to an upcoming S-wave, the system can alert residents before the S-waves arrive.
T2: Limitations	An Earthquake Early Warning System detects earthquakes to warn residents before shaking is felt. However, there are some limitations. Earthquake Early Warning Systems cannot predict earthquakes far in advance, and residents are only notified once it has already started deep underground, generally seconds before they will feel the shaking. Residents who are near the epicenter of an earthquake may not receive warning, or they may only receive it after ground shaking has already begun. Additionally, in some cases there may be alerts of an earthquake even if damaging shaking will not occur.
T3: Technical information and limitations	An Earthquake Early Warning System detects earthquakes to warn residents before shaking is felt. An earthquake involves two types of waves: the Primary wave (‘P-wave’) and the Secondary wave (‘S-wave’). The P-wave arrives first, but the damage is primarily caused by the slower S-waves. Many Earthquake Early Warning Systems operate by detecting the P-wave with complex sensors that are buried in the ground. When the sensors detect P-waves that indicate potential ground shaking due to an upcoming S-wave, the system can alert residents before the S-waves arrive. However, there are limitations. The systems cannot predict earthquakes far in advance, and residents are notified once it has already started underground, generally seconds before the shaking begins. Residents near the epicenter may not receive warning or receive it after ground shaking has begun. Additionally, sometimes there may be alerts of an earthquake even if damaging shaking will not occur.

Table B2. Additional questions about past earthquake experience and anxiety, knowledge of EEWS, and opinions on and preferences for EEWS

Past experience with earthquakes†	Please indicate the level of your past earthquake experience. Tick all that apply: a. Personally felt an earthquake before.

	b. Personally have felt strong shaking (i.e. where walking steadily is difficult. Furniture and appliances may move on smooth surfaces, and objects fall from walls and shelves.) c. Personally have experienced injury, damage, or loss from an earthquake d. Know family or friends who experienced injury, damage, or loss from an earthquake e. Suffered financial loss due to an earthquake f. Struggled mentally following an earthquake g. Observed earthquake loss in my neighborhood, village, or city h. Have seen the effects of the earthquake on TV, social media, etc. i. I haven't experienced any of the above
Earthquake anxiety††	How much do you agree with the following statement? "I am worried another big earthquake is going to happen where I live in Nepal in my lifetime." a. Highly agree (Very worried) b. Slightly agree c. Neither agree nor disagree d. Slightly disagree e. Highly disagree (Not at all worried)
Prior knowledge of EEWS	Do you know what an early earthquake warning system is? a. I have never heard of it. b. I have heard of it but do not know anything about it. c. I have heard of it and know a bit about them. d. I know what it is and how they work. e. I know what it is, how they work, and have formed detailed opinions about them.
Preferences for types of earthquakes for EEWS†	Please indicate the types of earthquakes you want an early warning for. a. For all earthquakes, independent of whether the shaking could be felt or not. b. For all earthquakes, I may feel. c. For all earthquakes, I will certainly feel. d. For all earthquakes that may cause damage. e. For all earthquakes that will certainly cause damage. f. I don't know.
Preferences for method of receiving EEWS	How would you prefer to receive an earthquake early warning? (choose your most preferred) a. Mobile phone alert (app) b. TV message c. Radio message d. Public announcements (via a loudspeaker or siren) e. Social media (Facebook, Twitter) f. A specific device designed to receive an earthquake early warning g. Other h. I don't know

Preferences for types of information from an EEWS	What kind of information would you want in an earthquake early warning? Choose all that apply: a. Time available before shaking begins b. Magnitude of earthquake c. Expected intensity of ground shaking d. Epicenter (point of earthquake origin) e. Expected duration of shaking f. Recommended actions
Projected behavior upon receiving EEWS[††]	Imagine you are in a building and an app on your phone sends a warning that you might experience a big earthquake in the next few seconds. What would you do? a. Run outside to open space b. Take cover and wait for the shaking to stop c. Stay calm and do nothing d. Try to reach my friends, family or anyone near me e. I don't know what I would do f. Other
Projected changes in behavior contingent upon size of earthquake	Would your behavior change if the notification indicated it might only be a smaller earthquake? a. My behavior would be the same for all earthquakes. b. I would change my behavior depending on how big the earthquake was expected to be. c. I don't know
Final open-ended question	Would you like to tell us your opinion about earthquake safety or any other topic? (Please type this in yourself.)

Note: Respondents were able to skip all questions.
[†] Adapted from Becker (2020). Some options or context may have been modified.
[††] Adapted from Dallo (2022) and Marti (2023). Some options or context may have been modified.
[*] The term 'natural disaster' was used due to the phrase's common use in colloquial language despite the fact that a disaster in terms of the devastation and loss of property and life can be distinguished from the natural hazard more precisely understood.

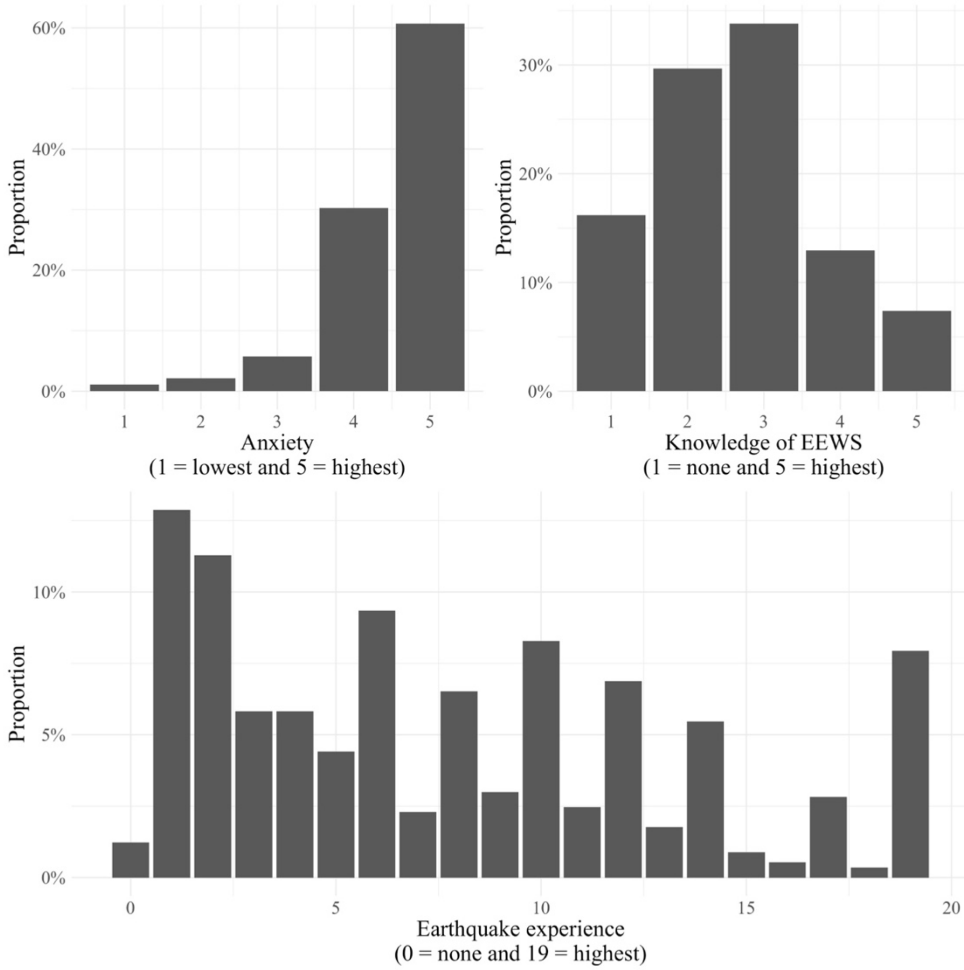
A score for each respondent's earthquake experience was created by assigning a value of metaphorical 'intensity' for earthquake experience. These are somewhat arbitrary and act more as a way to create a single value to indicate experience for each respondent to include as a covariate and to compare among respondents. The values can be found in Table B3. This variable can be utilized in its additive score form (with values between 0 and 19) or as an index where each score is divided by the maximum possible value (19) to transform the variable to lie between 0 to 1, though the additive score was used in the regressions in this paper due to its relative ease of interpretation.

Polychoric correlations can be found in Figure B4. Regressions with select variables fit with ordinary least squares (OLS) can be found in Table B4. Because there is no causal identification method used here, these regressions serve to describe the statistical relationship between variables, like a correlation, but one in which the associational relationship between each independent variable and the dependent variable is ‘controlled’ for all other variables. OLS on variables with five or more categories yields inferences close to ordered models in many cases (Norman 2010; Rhemtulla et al. 2012), which is relevant for Model I (7-point) and Model II (5-point). For Model III (binary), the linear probability model is a linear projection of the conditional probability and estimates changes in predicted probability associated with the regressors, conditional on other controls/covariates (Chen et al. 2023). Coefficients are thus partial associations on the probability scale. We use heteroskedasticity-robust standard errors for more valid inference (see discussion of variance issues in LPM in Hellevik 2009; see guidance in Gomila 2021; for treating Likert outcomes with OLS, see Norman 2010; Rhemtulla et al. 2012). Since conclusions using OLS often trend towards logit/probit for moderate effects in practice (Hellevik 2009; Gomila 2021; Chen et al. 2023) and trends in results do not typically hinge on model family (Ferrer-i-Carbonell and Frijters 2004), we use OLS for interpretability and because it requires no post-estimation transformations. As a check, however, we compare OLS to ordered logistic regression for Models I–II and to logistic regression for Model III, which can be found in the replication files. Perhaps the most notable finding in these regressions is that of the relationship between previous experience with earthquakes and information to be displayed on an app interface. Those in rural areas are also less likely to change their behavior depending on the size of the earthquake, which for most respondents, was to evacuate the building.

Table B3. Values assigned to each earthquake experience for earthquake experience score

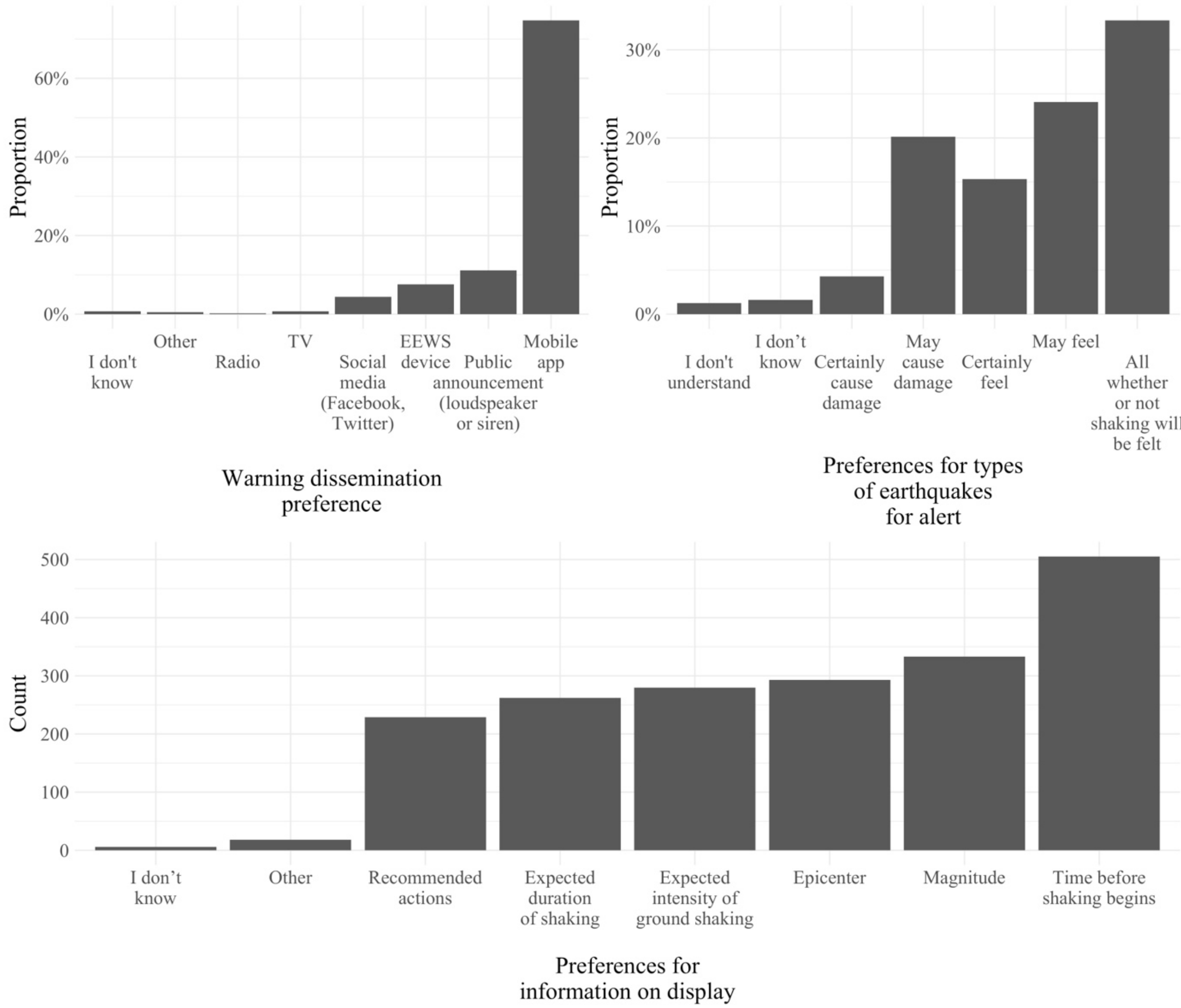
	Value
Personally have experienced injury, damage, or loss from an earthquake.	5
Know family or friends who experienced injury, damage, or loss from an earthquake.	4
Personally have felt strong shaking (i.e. where walking steadily is difficult. Furniture and appliances may move on smooth surfaces, and objects fall from walls and shelves.)	2
Suffered financial loss due to an earthquake.	2
Struggled mentally following an earthquake.	2
Observed earthquake loss in my neighborhood, village, or city.	2
Personally felt an earthquake before.	1
Have seen the effects of the earthquake on TV, social media, etc.	1
I haven’t experienced any of the above.	0
Total possible	19

Figure B1. Visualization for the descriptive data of respondents' earthquake experiences, anxiety, and knowledge of EEWS



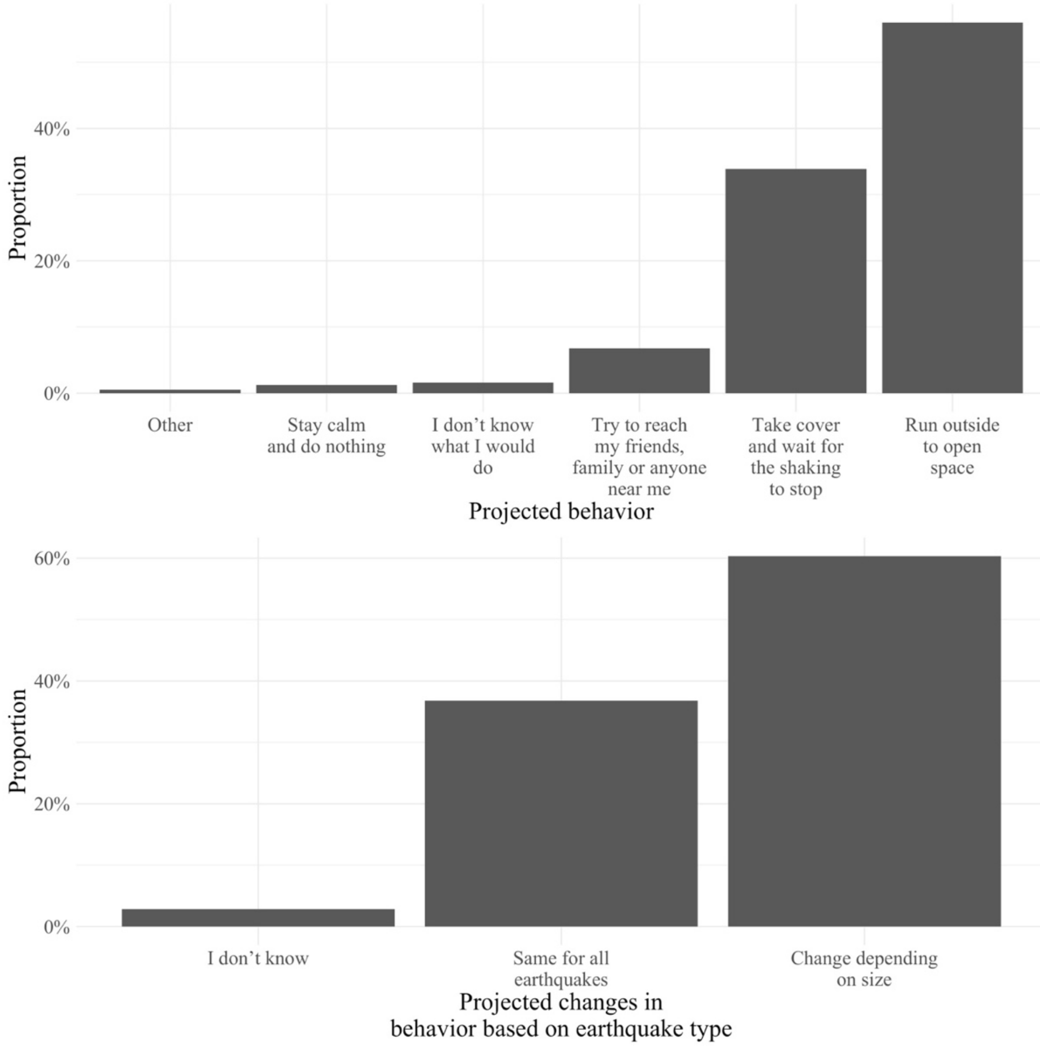
Note: Proportions are of the total without skips or missing values. Selection is mutually exclusive.

Figure B2. Visualization for the descriptive data of respondents' preferences for an EEWS app



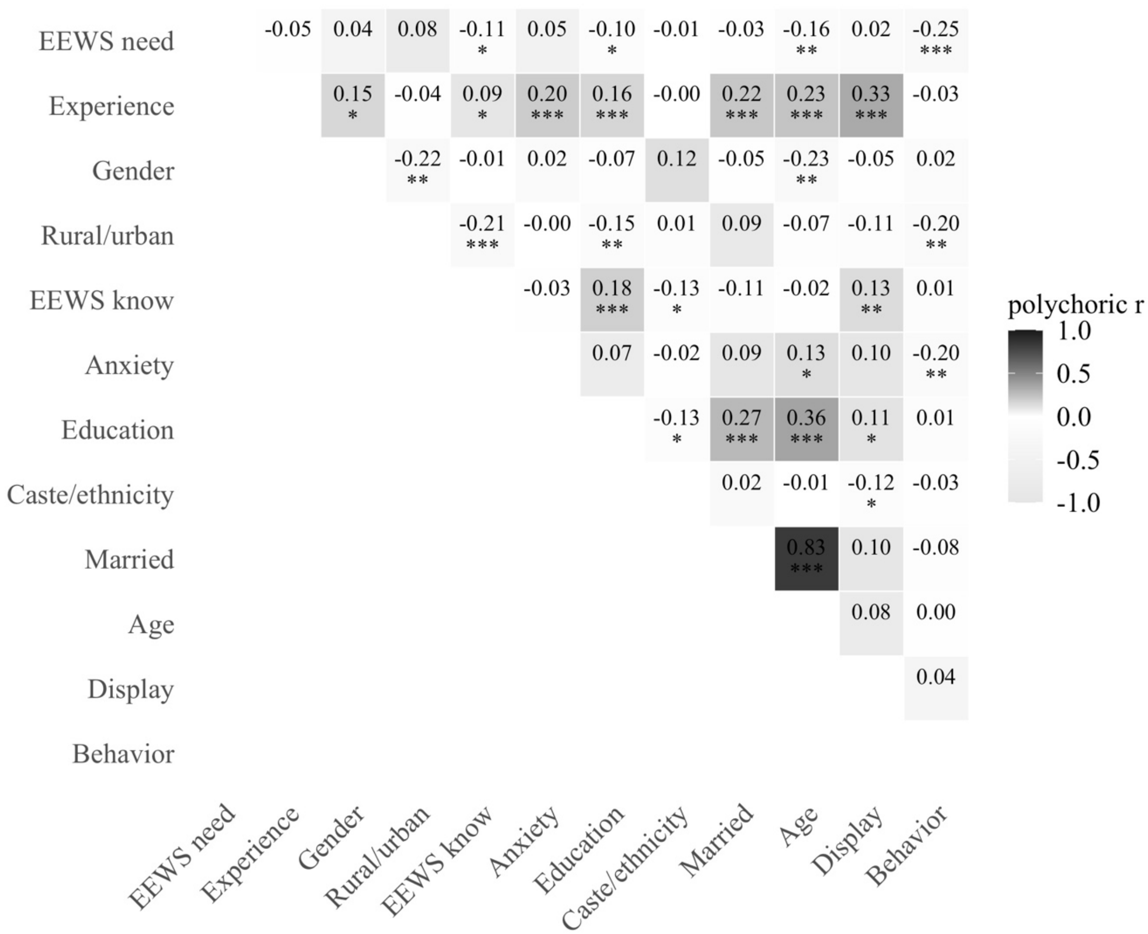
Note: Proportions are of the total without skips or missing values. Selection is mutually exclusive for warning dissemination (top left) and types of earthquakes preferences (top right). Selection is not mutually exclusive for information preferences (bottom).

Figure B3. Visualization for the descriptive data of respondents' projected behavior



Note: Proportions are of the total without skips or missing values. Selection is mutually exclusive.

Figure B4. Polychoric correlations for descriptive and demographic variables



Note: † < 0.1; * < 0.05; ** < 0.01; *** < 0.001. p-values are uncorrected. The diagonal has been removed. Pearson's correlation is in the replication code.

Table B4. Select regression results of three descriptive EEWS-related variables and individual-level characteristics

	Dependent variable		
	I	II	III
	Information to be displayed on an EEWS mobile app	Type of earthquake to trigger an EEWS alert	If one's behavior would change depending on earthquake 'size' in alert
Intercept	2.18**	3.82***	0.97***
	(0.66)	(0.41)	(0.17)
Experience score	0.11***	-0.01	-0.003
(1-19 score)	(0.02)	(0.01)	(0.004)
Gender	-0.41	0.19	0.001
(Male = 0, Female = 1)	(0.28)	(0.19)	(0.07)
Rural/urban	- 0.19†	0.07	-0.08**
(Urban = 0)	(0.11)	(0.08)	(0.03)
EEWS knowledge	0.15†	-0.07	-0.02
(5-point scale)	(0.08)	(0.05)	(0.02)
Earthquake anxiety	0.04	0.09	-0.06†
(5-point scale)	(0.12)	(0.07)	(0.03)
Education	0.06	-0.09	0.02
(Binned)	(0.12)	(0.08)	(0.030)
Caste/ethnicity	- 0.17	-0.05	-0.02
(Binned)	(0.11)	(0.07)	(0.03)
Marital status	0.37	0.28†	-0.06
(Single = 0, Married = 1)	(0.24)	(0.15)	(0.06)
Age	-0.15	-0.17*	0.01
(Binned)	(0.09)	(0.07)	(0.03)
Observations	477	470	466
Degrees of freedom	467	460	456
R^2	0.12	0.04	0.03
Adjusted R^2	0.11	0.02	0.02

Note: † < 0.1; * < 0.05; ** < 0.01; *** < 0.001. Standard errors (SE) in parentheses. SEs and p-value are robust using the HC3 estimator through the R package lmtest (Zeileis 2004; Zeileis et al. 2020). Dependent variable for model I is a score from 1 to 7 where every different type of information contributes a point of 1. Dependent variable for model II is on a 5-point scale with most inclusive being 5 (i.e., for all earthquakes no matter if felt or not) and least inclusive (i.e., only for earthquakes that definitely will cause damage) being 1. Dependent variable for model III is a binary 0 to 1, where no change in behavior is 0 and change in behavior is 1. All models are fit with OLS.

C. Other specifications

We registered our preanalysis plan with OSF at the beginning of data collection on July 12, 2024. In line with the preanalysis plan, the main results were reported from the specification without covariates and our estimand was the SATE as estimated through linear regression, which takes the form of a linear probability for the third outcome. The main specifications of the paper can be found compared to specifications with covariates with imputed data can be found in Figure C1 and Table C1. The covariates included were a measure of earthquake experience, gender, an indicator for ruralness/urbanness, level of previous EEWS knowledge, an indicator of earthquake anxiety, education, caste/ethnicity, age (binned), and marital status (binned). The data were binned and recoded as can be found in the codebook. The data for the covariate specification were imputed for all covariates (not the treatment) other than earthquake experience using the MICE R package (Buuren and Groothuis-Oudshoorn 2011). Specifications with non-imputed data can be found in the replication materials for this paper.

We computed pairwise standardized mean differences (SMDs) to compare each treatment arm to the control for all covariates through the R package RItools (Table C2) (Bowers et al. 2008; Hansen and Bowers 2008; though see Montgomery et al. 2018; Mutz et al. 2019 for more discussion on balance). Observed differences reflect a few categories that were overrepresented in specific arms, which is consistent with random fluctuations expected in multi-arm trials with relatively small per-arm samples as shown by the randomization test ($p = 0.506$).

Indeed, our qualitative data supported the findings of the survey experiment. We encountered strong evidence for a negative relationship between information about the limitations (including the combined information) and opinions on the system's usefulness in the qualitative interview data. This includes respondent surprise, engagement with the interviewer, and stated changes in opinions. The qualitative data further suggested that some users believed their behavior would be influenced by this information if they were to receive an alert. Due to this and the low baseline knowledge of EEWS in our sample (which is notable in itself since it is a relatively educated sample compared to Nepal's population), we thus believe our findings to be indicative of a true effect if not in magnitude (due to the small sample size), at least in direction. In terms of our larger theoretical framework and the overall implications of this study, we believe the findings thus can act as the basis for future research with other samples and populations.

Table C1. Survey experiment results in different model specifications

	Outcome					
	Desire to implement the system		Opinions on the system's usefulness		Interest in learning more	
	I	II	III	IV	V	VI
Intercept	4.8*** (0.06)	4.41*** (0.21)	4.85*** (0.04)	4.32*** (0.21)	0.86*** (0.03)	0.75*** (0.12)
T1: Technical information	0.09 (0.07)	0.09 (0.07)	-0.05 (0.05)	-0.04 (0.06)	-0.01 (0.04)	-0.01 (0.04)
T2: Limitations	-0.05 (0.08)	-0.05 (0.08)	-0.14* (0.06)	-0.12* (0.06)	0.10** (0.04)	0.10** (0.04)
T3: Combined	-0.02 (0.07)	-0.01 (0.07)	-0.16* (0.06)	-0.15 * (0.06)	0.03 (0.04)	0.03 (0.04)
Experience score	--	-0.01 (0.005)	--	-0.002 (0.004)	--	0.002 (0.002)
Gender	--	-0.04 (0.09)	--	-0.01 (0.08)	--	-0.04 (0.05)
Rural/urban	--	-0.06 † (0.03)	--	-0.02 (0.03)	--	0.01 (0.02)
EEWS knowledge	--	0.01 (0.03)	--	0.01 (0.02)	--	-0.01 (0.01)
Earthquake anxiety	--	0.10 ** (0.04)	--	0.11 ** (0.04)	--	0.02 (0.02)
Education	--	-0.01 (0.04)	--	0.01 (0.03)	--	0.0003 (0.02)
Caste/ethnicity	--	-0.03 (0.03)	--	-0.005 (0.03)	--	0.01 (0.02)
Marital status	--	0.11 (0.07)	--	0.03 (0.05)	--	0.03 (0.04)
Age	--	0.002 (0.03)	--	0.01 (0.02)	--	0.01 (0.01)
R^2	0.009	0.046	0.016	0.052	0.017	0.033
Adjusted R^2	0.003	0.024	0.011	0.030	0.011	0.010
Observations	537	533	536	533	513	510

Note: † < 0.1; * < 0.05; ** < 0.01; *** < 0.001. Standard errors in parentheses. SEs are robust using the HC3 estimator using lmtest R package (Zeileis 2004; Zeileis et al. 2020). Outcomes in models I – IV are on a 5-point scale. Outcome in models V – VI are on a 0 to 1 scale. Data for covariates other than earthquake experience score were imputed using MICE and miceadds R packages (Buuren and Groothuis-Oudshoorn 2011; Robitzsch and Grund 2024). The estimator used for all models is linear regression. Tests are two-tailed.

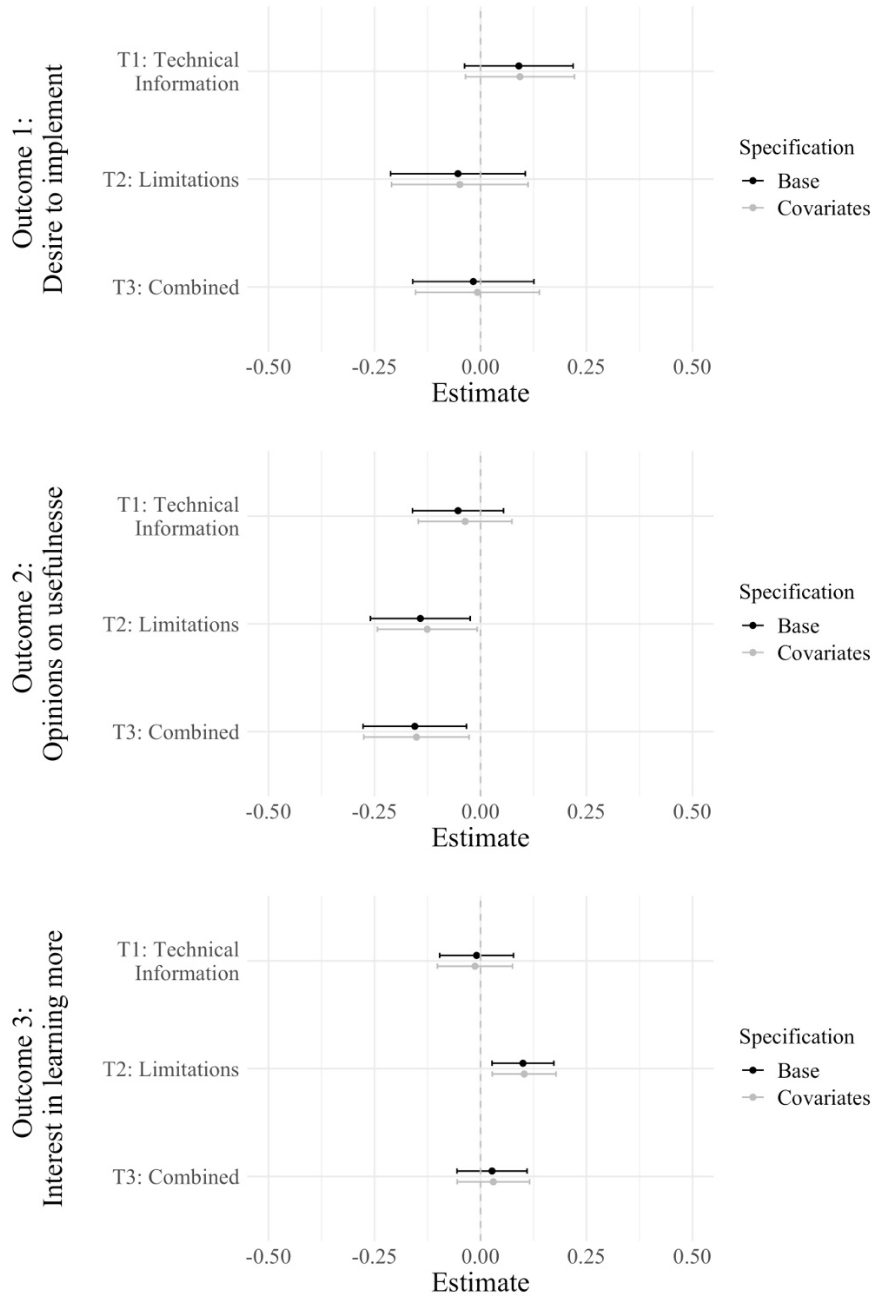
Table C2. Standardized mean differences for covariates between the control and treatment arms

	Type	Code	Treatment	Control	Std difference	z-score
Experience score‡	Continuous	1-19 score	8.13	8.31	-0.03	-0.82
Gender	Categorical	0 - Male	0.839	0.847	-0.02	-0.64
		1 - Female	0.147	0.137	0.03	0.78
		NA	0.0141	0.0153	-0.01	-0.24
Rural/urban	Categorical	0 - Urban	0.578	0.588	-0.02	-0.52
		1 - Town	0.216	0.214	0.01	0.15
		2 - Village	0.185	0.168	0.04	1.16
		NA	0.0207	0.0305	-0.08	-2.04*
EEWS knowledge (5-point scale)	Ordered	1 - Lowest	0.173	0.191	-0.05	-1.22
		2 -	0.269	0.260	0.02	0.55
		3	0.340	0.313	0.06	1.52
		4	0.124	0.145	-0.06	-1.64
		5 - Highest	0.0932	0.0916	0.01	0.16
		NA	0.0278	0.0305	-0.02	-0.51
Earthquake anxiety (5-point scale)	Ordered	1 - Lowest	0.0392	0.0458	-0.04	-0.98
		2	0.0194	0.0229	-0.02	-0.62
		3	0.0374	0.0382	0.00	-0.09
		4	0.274	0.252	0.05	1.30
		5 - Highest	0.630	0.641	-0.02	-0.62
		NA	0.0285	0.0305	-0.01	-0.36
Education (Binned)	Ordered	0 - No formal	0.0290	0.0229	0.03	0.83
		1 - Pre-primary & primary	0.00625	0.00	0.07	1.73†
		2 - Secondary	0.333	0.328	0.01	0.30
		3 - University	0.426	0.435	-0.02	-0.51
		4 - Post-grad	0.206	0.214	-0.02	-0.54
		NA	0.0257	0.0229	0.02	0.42
Caste/ethnicity (Binned)	Categorical	0 - Bahun/ Chhetri	0.542	0.542	0.00	0.00
		1 - Newar	0.209	0.229	-0.05	-1.29
		2 - Other	0.216	0.191	0.06	1.56
		NA	0.0330	0.0382	-0.03	-0.77
Marital status	Categorical	0 - Single	0.605	0.580	0.05	1.32
		1 - Married	0.355	0.374	-0.04	-1.01
		NA	0.0397	0.0458	-0.03	-0.83
Age	Ordered	0 - 18-25	0.464	0.466	0.00	-0.07
		1- 26-35	0.287	0.267	0.04	1.16
		2 - 36-45	0.139	0.145	-0.02	0.45
		3 – 46-55	0.0523	0.0458	0.03	0.77
		4 - 56 - 65	0.0361	0.0458	-0.05	-1.31

	5 - 66+	0.0213	0.0305	-0.06	-1.66†
	NA	0.0367	.0305	0.03	0.83
Overall test χ^2	31				
df	32				
p-value	0.506				

Note: † < 0.1; * < 0.05; ** < 0.01; *** < 0.001. Calculations made with R package RItools (Bowers et al. 2008).
‡Experience is treated as continuous since there are >10 categories.

Figure C1. Results from the survey experiment with and without covariates



Note: The first and second outcomes are on a five-point scale. The third outcome is on a 0 to 1 scale. CIs are set to 95% and created from HC3 robust standard errors using lmtest R package (Zeileis 2004; Zeileis et al. 2020). The base specification was reported in the main paper.

D. Interview instrument and data

The interviews were semi-structured with a base instrument of nine questions, two of which had four to five distinct subquestions (i.e., "*Would knowing this new information change your behavior if you were to receive a warning? How so*?") (Table D1). The interviews were in-person in Nepali and completed by a recent engineering university graduate from the Institute of Engineering, a highly regarded engineering school in Nepal. Each respondent was offered a 200 NPR phone recharge card (around 1.50 USD) for their time, which was not contingent on them finishing the interview or answering all questions. The instrument began with questions that asked if the respondent had ever heard about EEWS and what they knew about it. This gave us a baseline from which to understand information in the rest of the interview, including how the respondent reacted to the technical information and/or limitations and why that might be. The interviewer then informed the respondents about the technical information and/or limitations and engaged them about what they thought about this information and how it might affect their opinions on, preferences for, and hypothetical behaviors concerning EEWS. We noted both their answers and the general tenor of their engagement. After this, we read the respondent the treatment(s) from the survey portion of our study and asked them why we might have seen the results we did. Here, we took the strategy of approaching respondents as experts. Indeed, many respondents had thoughtful ways of engaging the question, drawing upon their own experiences and what they knew about their own networks of people to speculate on mechanisms behind the results. We ended by asking how important they thought implementing an EEWS in Nepal was, especially compared to other types of infrastructural and developmental priorities. Overall, the interviews served to explore mechanisms behind the results we found in the survey experiment.

Table D1. Interview semi-structured instrument

Assess previous knowledge	1. Have you heard of an earthquake early warning system?
	2. What do you know about it?
Assess reactions to limitations and technical info	3. *Tell them about limitations and/or technical info (vary order by interviewee). Note surprise (if any) and/or reaction.* a. What do you think about this new information? b. Would knowing this new information change your behavior if you were to receive a warning? How so? c. Do you think more people should be educated about this difference? Is it important information? d. How many people do you think know this about EEWS? What about your friends and family? e. Does it change your opinion on EEWS at all? Do you think it's important to implement such a system?
Elicit reactions to survey results and	4. In some recent research (*can go into detail here*), we found that people believed that earthquake early warning systems were slightly less

assess what information interviewees' think is necessary for EEWS	useful after they read about these types of limitations and technical background on the system. Can you think of why that would be?
	5. Can I read you the information (we used in our recent research) and get your opinion on it? *(read information)* a. Why do you think people thought the system was less useful for them after this? b. Do you think this is good information? What is important in this information, and what is not important, in your opinion, for Nepali people to know? c. What other information do you think is important?
Assess larger earthquake DRR concerns	6. What would make you feel safer in regards to future earthquakes in Nepal?
Assess larger hazard DRR concerns	7. (*Cluster question*) How important do you think earthquake warning systems are? How does that compare to other things like early warnings for floods, landslides or air pollution? How does this compare to priority for development like new roads or infrastructure in general? (i.e., how urgent is it to implement warning systems)
Obtain opinions on management	8. Who do you think is best to manage these types of system?
Wrap-up	9. Do you have any more questions for me about our study or anything else on your mind?

E. Nepali-language versions

The Nepali version for selected survey questions can be found in Table E1. The translations for survey experiment vignettes can be found in Table E2. The translations for the semi-structured interview instrument can be found in Table E3.

Table E1. Nepali version of additional questions about past earthquake experience and anxiety, knowledge of EEWS, and opinions on and preferences for EEWS

Past experience with earthquakes†	कृपया आफ्नो विगतको भूकम्प अनुभवको स्तर संकेत गर्नुहोस्। लागू हुने सबैमा चिन्ह लगाउनुहोस् : १. व्यक्तिगत रुपमा भूकम्पको अनुभव गरेको छु २. व्यक्तिगत रुपमा बेस्सरी जमिन हल्लिएको महसुस गरेको छु (जब सीधा हिड्न गाह्रो हुन्छ, फर्निचर र उपकरण चिल्लो सतहमा सर्न सक्छन र सामान हरु भित्ता र दराज बाट झर्न सक्छन) ३. व्यक्तिगत रूपमा भूकम्पबाट चोटपटक, क्षति, वा हानि अनुभव गरेको छु ४. भूकम्पबाट चोटपटक, क्षति वा हानि अनुभव गर्ने परिवार वा साथीहरूलाई चिन्छु ५. भूकम्पका कारण आर्थिक क्षति अनुभव गरेको छु ६. भूकम्पपछि मानसिक रुपमा संघर्ष गरेको छु ७. मेरो छिमेक, गाउँ वा सहरमा भूकम्पको क्षति देखेको छु ८. टिभी, सामाजिक सञ्जाल आदिमा भूकम्पको प्रभाव देखेको छु ९. मैले माथिका कुनै पनि अनुभव गरेको छैन

Earthquake anxiety††	तपाई निम्न भनाइसँग कतिको सहमत हुनुहुन्छ? “ म बस्ने ठाउँमा मेरो जीवनभरिमा अर्को ठुलो भूकम्प आउला भनेर चिन्तित छु | ” १ - अत्यन्त सहमत (धेरै चिन्तित) २ - अलि-अलि सहमत ३ - न सहमत न असहमत ४ - अलि-अलि असहमत ५ - अत्यन्त असहमत (कति पनि चिन्तित छैन)
Prior knowledge of EEWS	के तपाईलाई भूकम्प प्रारम्भिक चेतावनी प्रणाली भनेको के हो थाहा छ ? १. मैले कहिल्यै सुनेको छैन | २. मैले पहिले सुनेको छु तर यसको बारेमा केहि पनि थाहा छैन | ३. मैले सुनेको छु र थोरै थाहा पनि छ | ४. मैले सुनेको छु र यो कसरि कम गर्छ पनि थाहा छ | ५. मैले सुनेको छु, यो कसरि कम गर्छ थाहा छ र यसको बारेमा मेरो आफ्नो धारणा पनि बनिसकेको छु |
Preferences for types of earthquakes for EEWS†	कस्ता प्रकारका भूकम्पहरुको तपाई प्रारम्भिक चेतावनी चाहनुहुन्छ ? १. सबै भूकम्पको, जमिन हल्लेको महसुस भएपनि नभएपनि २. मैले महसुस गर्ने सक्ने सबै भूकम्पको ३. मैले निश्चित रुपमा महुस गर्ने सबै भूकम्प को ४. क्ष्यति गर्ने सक्ने सबै भूकम्प को ५. निश्चित रुपमा क्ष्यति गर्ने सबै भूकम्प को ६. मलाई थाहा छैन ७. मैले बुझिन
Preferences for method of receiving EEWS	तपाई भूकम्पको प्रारम्भिक चेतावनी के मार्फत प्राप्त गर्न चाहनुहुन्छ? (सबै भन्दा मन पर्ने छान्नुहोस्) १. मोबाइल फोन (एप) २. टेलिभिजन ३. रेडियो ४. सार्वजनिक घोषणा (लाउडस्पिकर वा साइरन बाट) ५. सामाजिक संजाल (फेसबुक, ट्वीटरतर) ६. भूकम्प प्रारम्भिक घोषणाको लागि नै बनाइएको कुनै बिशेष उपकरण ७. अरु ८. मलाई थाहा छैन
Preferences for types of information from an EEWS	भूकम्पको प्रारम्भिक चेतावनी मा तपाई कस्तो प्रकारको जानकारी चाहनुहुन्छ ? लागु हुने सबैमा चिन्ह लगाउनुहोस् : १. जमिन हल्लिन सुरु हुन बाकि भएको समय २. भूकम्पको परिमाण ३. जमिन कति हलिन्छ भन्ने पूर्वानुमान ४. भूकम्पको केन्द्रबिन्दु (भूकम्पको उद्गम स्थल) ५. जमिन हल्लिने समय अबधिको पूर्वानुमान ६. के गर्ने भनेर सुझाव ७. अरु ८. मलाई थाहा छैन
Projected behavior upon receiving EEWS††	मानौ कि तपाई घर भित्र हुनुहुन्छ र, तपाईको फोनमा एउटा एप छ जसले तपाईलाई केहि सेकेन्डपछि ठुलो भूकम्प आउंछ भनेर प्रारम्भिक चेतावनी दिन्छ | तपाई यस बेला के गर्नुहुन्छ ? १. बाहिर खुल्ला ठाउँ तिर दौडीन्छु २. केहि बेर मुनि बस्छु र जमिन हल्लिन रोकिउन्जेल प्रतिक्षा गर्छु

<table>
<tr><td></td><td>३. शान्त रहन्छु र केहि गर्दैन
४. मेरा साथीहरू, परिवार वा मेरो नजिकको कसैसंग पुग्न प्रयास गर्छु
५. मलाई थाह छैन कि म के गर्छु
६. अन्य</td></tr>
<tr><td>Projected changes in behavior contingent upon size of earthquake</td><td>यदि प्रारम्भिक चेतावनीले सानो भूकम्प जनाएको भए, के तपाईको प्रतिक्रिया फरक हुन्थ्यो ?
१. मेरो प्रतिक्रिया सबै खाले भूकम्प लाई उही हुनेछ |
२. मेरो प्रतिक्रिया भूकम्प कतिको ठुलो छ भन्ने मा फरक पर्ने छ |
३. मलाई थाहा छैन</td></tr>
<tr><td>Final open-ended question</td><td>भूकम्प सुरक्षा वा अरु कुनै विषय बारे तपाई हामीलाई आफ्नो धारणा भन्न चाहनुहुन्छ ? (कृपया यो आफैले टाइप गर्नुहोस)</td></tr>
</table>

Note: Respondents were able to skip all questions, which in Nepali we wrote as जवाफ छोड्छु.

† Adapted from Becker (2020). Some options or context may have been modified.

†† Adapted from Dallo (2022). Some options or context may have been modified.

Table E2. Nepali version of vignettes to measure the effect of technical information and limitations of EEWS

<table>
<tr><td>Control</td><td>भूकम्प प्रारम्भिक चेतावनी प्रणाली भनेको भूकम्पको जोखिम हुने ठाउँहरुमा राखिने प्रणाली हो | यो प्रणालीले भूकम्प आउँदा जमिन हल्लिन सक्छ भनेर त्यहाँका बासिन्दाहरुलाई सूचना दिन्छ| नेपालमा थुप्रै भूकम्प आइरहेको हुन्छन जस्तै २०७२ (२०१५) को गोर्खा भूकम्प | त्यसैले, भूकम्प प्रारम्भिक चेतावनी प्रणाली नेपाल जस्तै ठाउको निमित्त हो | यसको उदेश्य देशका जनताहरुलाई भूकम्पका कारण जमिन हल्लिन सक्छ भनेर चेतावनी दिनु हो |</td></tr>
<tr><td>T1: Technical information</td><td>भूकम्प प्रारम्भिक चेतावनी प्रणालीले भूकम्प आएको पत्तालगाई बासिन्दाहरुलाई जमिन हल्लिन सक्छ भनेर चेतावनी दिन्छ | भूकम्प आउँदा दुई किसिमका तरंगहरु उत्पन्न हुन्छन: पहिलो प्राथमिक तरंग र दोस्रो सेकेण्डरी तरंग| प्राथमिक तरंग धेरै छिटो चल्छ र कुनै पनि ठाउँमा छिटो आइपुग्छ तर क्षेति भने सेकेण्डरी तरंगले धेरै पुर्याउछ, जुन धेरै बिस्तारै चल्छ | धेरै भूकम्प प्रारम्भिक चेतवानी प्रणालीहरु जमिन भित्र गाडिएका जटिल सेन्सरहरुको सहयताले प्राथमिक तरंग पत्ता लगाएर काम गर्दछन् | जब सेन्सरहरुले प्राथमिक तरंग पत्ता लगाउछन् जुनले भविस्य मा जमिन हल्लिन सक्ने संकेत गर्दछ, यस प्रणालीले बासिन्दाहरुलाई चेतावनी दिन सक्छ | यो चेतावनी सेकेण्डरी तरंगआइपुग्नु अघि दिइन्छ |</td></tr>
<tr><td>T2: Limitations</td><td>भूकम्प प्रारम्भिक चेतावनी प्रणालीले भूकम्प आएको ठाउँ मा भूकम्प आएको पत्ता लगाई बासिन्दाहरुलाई जमिन हल्लिन सक्छ भनेर चेतावनी दिन्छ | यद्दपी, यसको धेरै सिमितताहरु पनि छन् | भूकम्प प्रारम्भिक चेतावनी प्रणालीले भुक्मप आउन अगाडी भाविस्यवाणी गर्न सक्दैन, र भूकम्प जमिन मुनि सुरु भैसकेपछि मात्र सुचित गर्दछ, सामान्यता जमिन हल्लिन सुरु हुनु भन्दा केहि सेकेन्ड अघाडी मात्र | भूकम्पको केन्द्रबिन्दु नजिकका बासिन्दाहरुले चेतावनी प्राप्त नगर्नसक्छन्व जमिन हल्लेपछी मात्र प्राप्त गर्छन | थप कतिपय बेला,वास्तविकमा नोक्सान हुने गरि जमिन नहल्लिदा पनि भूकम्पको पुर्व चेतावनी भने आउन सक्छ |</td></tr>
<tr><td>T3: Technical information and limitations</td><td>भूकम्प प्रारम्भिक चेतावनी प्रणालीले भूकम्प आएको ठाउँ मा भूकम्प आएको पत्ता लगाई बासिन्दाहरुलाई जमिन हल्लिन सक्छ भनेर चेतावनी दिन्छ | धेरै भूकम्प प्रारम्भिक चेतवानी प्रणालीहरु जमिन भित्र गाडिएका जटिल सेन्सरहरुको सहयताले प्राथमिक तरंग पत्ता लगाएर काम कम गर्दछन् | जब सेन्सरहरुले प्राथमिक तरंग पत्ता लगाउछन् जुनले भविस्य मा जमिन हल्लिन सक्ने संकेत गर्दछ, यस प्रणालीले बासिन्दाहरुलाई चेतावनी दिन सक्छ | यो चेतावनी सेकेण्डरी तरंग आइपुग्नु अघि दिइन्छ | यद्दपी, यसको धेरै सिमितताहरु पनि छन् | भूकम्प प्रारम्भिक चेतावनी प्रणालीले भुक्मप आउन अघाडी भाविस्यवाणी गर्न सक्दैन, र भूकम्प जमिन मुनि सुरु भैसकेपछि मात्र सुचित गर्दछ, सामान्यता जमिन हल्लिन सुरु हुनु भन्दा केहि सेकेन्ड अघाडी मात्र | भूकम्पको केन्द्रबिन्दु नजिकका बासिन्दाहरुले चेतावनी प्राप्त नगर्न</td></tr>
</table>

	सक्छन् सक्दैनन् वा जमिन हल्लेपछी मात्र प्राप्त गर्दछन | थप कतिपय बेला,वास्तविकमा नोक्सान हुने गरि जमिन नहल्लिदा पनि भूकम्पको पुर्व चेतावनी भने आउन सक्छ |

Table E3. Nepali version of interview semi-structured instrument

Assess previous knowledge	1. के तपाईले भूकम्प प्रारम्भिक चेतावनी प्रणालीको बारेमा सुन्नुभएको छ ?
	2. तपाइलाई यस बारे के थाहा छ ?
Assess reactions to limitations and technical info	3. सीमितताहरू र/वा प्राविधिक जानकारीहरूबारे जानकारी दिने । आश्चर्य (यदि छ भने) र/वा प्रतिक्रिया उल्लेख गर्ने । - तपाईंलाई यो नयाँ जानकारी बारेमा के लाग्छ ? - यदि तपाईंले चेतावनी पाउनु भएमा, यो नयाँ जानकारी जान्दा तपाईंको व्यवहारमा कुनै परिवर्तन आउँछ? कसरी? - के तपाईंलाई लाग्छ, यो भिन्नताबारे थप मानिसहरूलाई जानकारी दिनुपर्छ ? यो महत्वपूर्ण जानकारी हो ? - तपाईंलाई कति जनाले भूकम्प प्रारम्भिक चेतावनी प्रणाली का बारेमा यो कुरा थाहा छ जस्तो लाग्छ? तपाईका साथी र परिवारको बारेमा के भन्नु हुन्छ ? - के यसले भूकम्प प्रारम्भिक चेतावनी प्रणाली प्रति तपाईंको धारणा परिवर्तन गर्छ? के तपाईंलाई यस्तो प्रणाली लागू गर्नु महत्वपूर्ण लाग्छ?
Elicit reactions to survey results and assess what information interviewees' think is necessary for EEWS	4. हालसालै गरिएको एक अनुसन्धानमा (यहाँ तपाईँ विस्तारमा जान सकिन्छ), हामीले पत्ता लगायौं कि भूकम्प प्रारम्भिक चेतावनी प्रणालीहरूका यस्ता प्रकारका सीमितताहरू र प्राविधिक पृष्ठभूमिको बारेमा पढेपछि मानिसहरूले ती प्रणालीहरूलाई अलि कम उपयोगी ठाने। तपाईँलाई किन यस्तो होला भन्ने लाग्छ ?
	5. के म तपाईंलाई यो जानकारी पढेर तपाईंको विचार लिन सक्छु ? - यो जानकारी सुनेपछि मानिसहरूले यो प्रणालीलाई आफ्ना लागि कम उपयोगी किन ठाने जस्तो लाग्छ ? - तपाईंलाई यो जानकारी राम्रो लाग्यो? यस जानकारीमा के महत्वपुर्ण छ र छैन जस्तो लाग्छ र के चाहिँ नेपाली जनता लाई जान्न जरुरि छ | - तपाईंलाई यस बाहेक अरु केहि जानकारी महत्त्वपूर्ण छ जस्तो लाग्छ ?
Assess larger earthquake DRR concerns	6. नेपालमा भविष्यमा आउने भूकम्पहरूको सन्दर्भमा के कुराले तपाईंलाई बढी सुरक्षित महसुस गराउँछ ?
Assess larger hazard DRR concerns	7. (Cluster question) तपाईंलाई भूकम्प प्रारम्भिक चेतावनी प्रणाली कत्तिको महत्त्वपूर्ण लाग्छ ? यो बाढी, पहिरो वा वायु प्रदूषण जस्ता अन्य प्रारम्भिक चेतावनीहरू जत्तिकै महत्त्वपूर्ण छ कि छैन ? यसलाई नयाँ सडक वा सामान्य रूपमा पूर्वाधार विकासजस्ता प्राथमिकतासँग कसरी तुलना गर्न सकिन्छ? (अर्थात्, चेतावनी प्रणाली कार्यान्वयन गर्न कत्तिको आवश्यक छ ?)
Obtain opinions on management	8. यस प्रकारको प्रणालीहरुको व्यवस्थापन हजुरलाई कसले गरेको राम्रो हुन्छ जस्तो लाग्छ ?
Wrap-up	9. के तपाइँ हामीलाई हाम्रो अध्यन बारे वा अरु जुनसुकै बारेमा प्रश्न सोध्न चाहनु हुन्छ ?

F. Logistic regressions

The data were also fit with ordered logistic regression for the outcomes on a 5-point scale (desire for implementation and opinions on the system's usefulness) and a logistic regression for the outcome on a binary scale (interest in learning more). The regression coefficients can be seen in Table F1. The predicted probabilities can be found in the replication code for this paper.

Table F1. Logistic regression coefficients

	Outcome		
	I	II	III
	Desire for the system to be implemented	Opinion on the system's usefulness	Interest in learning more
T1: Technical information	0.53	-0.46	-0.07
	(0.41)	(0.34)	(0.35)
T2: Limitations	-0.31	-0.92**	1.30*
	(0.36)	(0.34)	(0.52)
T3: Combined	-0.25	-0.88**	0.24
	(0.35)	(0.33)	(0.37)
Nagelkerke's R^2	0.017	0.029	0.037
Observations	537	536	513

Note: † < 0.1; < 0.05 '*'; < 0.01 '**'; < 0.001 '***'; p-values are found through t-tests (models I and II) or z-test (model III) using lmtest (Zeileis and Hothorn 2002), and standard errors in parentheses. Logistic regression for models I and II is ordered for the 5-point outcome. Nagelkerke's R^2 calculated for models I and II with R package performance (Lüdecke et al. 2021) and model III with fmsb (Nakazawa 2024).

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