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An analysis of use and effectiveness of communication channels, media and tools in post-earthquake private housing reconstruction in Nepal

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ABSTRACT

In the wake of any disaster, communication plays a significant role in attaining the objective of Build Back Better; to provide accurate and timely information to the affected communities, enhance awareness and extend outreach of authorities. Although communication channels, media and tools pave the way to eliminate information gaps at different levels of the process, not all of them work effectively. This paper explores the channels, media and tools used for communication during the reconstruction of private houses after the 2015 Gorkha earthquake in Nepal, their effectiveness in providing quality information to the beneficiaries and its correlation with reconstruction outcome of construction time period. With aid of both qualitative and quantitative methodological approaches, three target groups (beneficiary, implementation and policy levels) were surveyed. Convenience sampling method was used to collect the data of beneficiary level survey where structured telephone interview was conducted among 274 earthquake reconstruction program beneficiaries of four earthquake affected districts; Kathmandu, Dhading, Nuwakot and Dolakha. Purposive sampling method was used to collect data from implementation and policy level respondents using web based survey. Results revealed that communication channels varied differently among different target groups, based on their role in reconstruction, level of education and accessibility. Where beneficiaries perceived to have received information regarding reconstruction on time and clearly, the time taken to complete construction had significantly decreased. Thus, to increase communication and outreach, understanding the diversity of target groups at different levels and usage of multiple media tools and channels is important. Comprehensive communication strategies and programs with ample resources, especially at the local and community levels for local mass media and person-to-person information sharing is crucial to disseminate information to end-users on time. This, followed by adequate monitoring for quality assurance and credibility aids the post-disaster reconstruction of private households in an owner driven reconstruction approach.

1. Background

The twenty-first century is widely referred to as the age of communication. With the advent of new technologies and digital communication channels, advancement and transformation of traditional media, the dependency of people on mass media for information has been significantly increased [1]. Although there are divergent views among the communication experts regarding the influence of media in the society and complexity to measure it, nonetheless role of mass media in disseminating information, educating people and triggering behavioral change cannot be ruled out. Communication technology has been recognized as integral to disaster management for a long time [1].

In disaster risk management too, role of mass media has been widely appreciated. Especially during and immediately after a disaster, various communication medium such as radio, television, phone communication, print and even social media are primary sources of information and messages for victims and general people. The well-established fact is that mass media has tremendously contributed during various past disaster events especially in the disaster response related activities [1]. However, its role is not limited to this.

The role of effective communication is paramount in all cycles of disaster management, preparedness, response, relief and recovery [8]). It helps communicate important messages or information about preparedness, impact of disaster, rescue and relief efforts, vital reconstruction messages and more. Reconstruction of destroyed and damaged infrastructures is one of the key phases of disaster management cycle [6]. Post-disaster reconstruction consist of rebuilding flattened houses, as well as increasing local capacity and knowledge on disaster risk reduction measures [6]. Earlier studies have identified 'information sharing' as a major component that fuels a post-disaster recovery program [4]. Communication, especially,

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supports a disaster recovery process not just as a tool for sharing information on policy, but also to increase public discourse, support the roles of authorities and advocates for risk reduction [5].

The task of rebuilding homes and communities is complex, challenging and apprehensive with potential pitfalls. In post-disaster situations the status quo shifts constantly, a challenge that makes strategic communication a crucial element in the response and reconstruction environment. Effective communication in a reconstruction is not about what governments and projects "say" but what beneficiaries "hear" [7]. An effective communication means target group gets the information and messages as per expectation which was conveyed to them and it was able to change their mindset, attitudes, behavior and views on particular issue [8]. For effective or strategic communication, it is needed to identify the four W's, namely; **who** is the audience, **what** is the message, **how** to disseminate, and **what** is the medium [8].

While past studies highlight the importance of communication and mass media in disaster management and post-disaster recovery, the array of channels, tools and media available have not been discussed in depth. Apart from mass media, various other channels such as person-to-person communication, awareness and training activities, demonstration construction are also available, and perhaps more prominent. In the post 2015 Gorkha earthquake housing reconstruction in Nepal, especially, a large amount of investment was done by the government as well as partner organizations in providing technical assistance and counselling through field engineers and social mobilizers deployed in the earthquake affected communities. Similarly, local governments also played significant role in information sharing. Thus, a study on new avenues of communication and their impacts on post-disaster recovery, especially in an owner driven reconstruction approach for private houses must be undertaken.

2. Introduction

The 2015 Gorkha earthquake was the largest disaster recorded in Nepal in terms of losses; over 9000 lives were lost and USD 7bn in economic losses was incurred [2]. To repair and reconstruct more than 825,000 houses damaged by the Gorkha Earthquake, the Government of Nepal led a process of reconstruction through the National Reconstruction Authority (NRA) with the mandate to plan and implement reconstruction activities (National Reconstruction [3]). To achieve the objectives of disaster resilient and sustainable reconstruction as highlighted in the recovery framework, the National Reconstruction Authority along with several development partners utilized different channels, tools, media to disseminate information to the beneficiaries and other stakeholders of the reconstruction program.

Organizationally three tiers can be visualized in communication during the reconstruction process. The National Reconstruction Authority as the governing body for reconstruction, its Project Implementation Units (PIUs) and national level partner organizations can be depicted as the first tier and the main source of information. These organizations, depicted as policy level actors in this study generate information and provide resource for various channels to disseminate them. The second tier in the process were implementation actors; field engineers and officials deployed by NRA and partner organizations and local government representatives, who directly engaged with and disseminated information to the beneficiaries on a community or household level. Inevitably, the earthquake reconstruction program beneficiaries were the end-users and the third tier of the communication process. Communication between these different tiers were facilitated by a wide array of channels; ranging from mass media such as television, radio and newspapers, digital and social media, print media such as IEC materials and notices to person-to-person communication via training, orientations and door-to-door campaigns.

This paper studies the effectiveness of communication channels, media and tools used by the policy and implementation actors in disseminating information regarding reconstruction by examining the perception of different target groups. The study also examines the correlation between beneficiary perception on quality of information received and their reconstruction outcome in terms of time taken for completion of construction. With these information, the paper derives crucial recommendations for developing and implementing effective communication efforts in future post-disaster recovery of private houses through an owner driven approach.

3. Research questions

The purpose of the study is to analyze how communication initiatives and use of different channels and media impacted the quality of information and reconstruction of houses of earthquake affected beneficiaries. As such the study encompasses four major questions:

1. What channels, media and tools of communication were mostly used during reconstruction?
2. What is the perception of different beneficiary groups towards the information received through different channels? What challenges were faced to provide adequate information on time?
3. What is the relationship between quality of information received by beneficiaries and their reconstruction outcome of construction time period?
4. What can be done to develop better communication strategies in future post-disaster recovery process?

4. Methodology and procedure

In order to attain the objectives of the study, both quantitative and qualitative research was conducted. The survey was administered at three target groups; **(1) Beneficiary Level Survey** targeted towards earthquake reconstruction beneficiaries who had or had not completed construction, **(2) Implementation Level Survey**, targeted towards major actors at national, district and local levels provided with authority and responsibility to disseminate information to beneficiaries and **(3) Policy Level Survey**, targeted to national level decision makers who were involved in designing and implementing different communication policies and tools. Primary data were collected either through telephone interview or internet survey during 5–15 August 2020 using Kobo Toolbox application. The collected data was downloaded, refined and analyzed using SPSS and excel software tools.

For the first target group, structured telephone interview was done among 274 house-owners of four most affected districts namely; Kathmandu, Dhading, Nuwakot and Dolakha. The convenience sampling method was used. The respondents were selected from the database of reconstruction beneficiaries collected through district authorities and partner organizations working in the area. The respondents were notified about the purpose of survey beforehand. For the second group, purposive sampling method was used. Respondents were identified from three categories, a) government officials (NRA district level officials and field engineers), b) partner organizations (I/NGO officials and field staff) working in reconstruction and c) local government representatives (elected and government officials at local levels). These respondents had direct involvement in implementation level of reconstruction i.e. providing information to earthquake beneficiaries. For the purpose of uniformity, 30 respondents from each category were identified and selected. Since the target group had access to internet, web based survey was done. Among the 90 selected respondents who had been contacted for the survey, 70 respondents filled up the survey forms.

Similarly, for policy level survey, reconstruction actors (NRA officials, partner organizations, and national level media) were purposively selected based on their direct involvement in reconstruction process, especially in the promulgation and dissemination of communication and information policies and materials. 20 professionals in this target group were selected for the survey where six of them responded. Different set of questions for three levels of respondents with multiple choice questionnaire were developed for the structured interview and internet survey.

Some typical questions asked to beneficiary level respondents are as follows:

- Have you completed construction of your earthquake damaged house? If yes, how much time did it take? If not, why haven't you constructed yet?
- What mass media platforms did you use for getting information on reconstruction? Apart from mass media, what other source of information did you have?
- To what extent do you agree that you received information regarding reconstruction on time? To what extent do you agree that you have received and understood all information regarding reconstruction? If you disagree, what information was mostly not very clearly received?
- If you had a technical challenge during construction, whom did you generally ask and receive required information? From where did you generally receive information regarding (change in) reconstruction policies and programs?
- Where did you place your queries, questions and issues of reconstruction? What mode of communication do you think is more suitable to share information regarding reconstruction in your community?

Additionally, some typical questions asked to the implementation level and policy level were as follows:

- To what extent do you agree that you have received relevant information on reconstruction from central/district level on time and clearly?
- To what extent do you agree that information regarding reconstruction policies and decisions has reached the affected beneficiaries in time? In your opinion, what were the major challenges in disseminating quality and credible information to beneficiaries in time?
- In your opinion, what strategy should be changed in future disaster reconstruction programs to make communication more effective?

5. Results and discussions

5.1. Distribution of respondents

In the beneficiary level respondents, altogether 274 house-owners responded the telephone survey. The distribution of the respondents according to district, construction status and level of education is presented in Table 1. Among them, 255 reconstruction beneficiaries had already completed the construction while 3 beneficiaries had not started. Among the respondents, majority (82%) were literate with varying levels of education whereas 18% were illiterate. Likewise, among a total of 70 participants who responded the implementation level survey, 27 (39%) were local government representatives, 25 (36%) were partner organization (PO) officials and 18 (26%) were government officials from NRA. Likewise six policy level respondents filled up the policy level survey forms.

Similarly, data in Table 2 highlights the distribution of the beneficiary level respondents based on the average time taken for completion of reconstruction.

Of the 255 beneficiary level respondents who stated completion of construction as in Table 1, highest proportion (28%) stated that they completed their construction within 1–2 months period. Similarly, 18% of respondents completed within the first month of initiation of construction while 17% started they took 2–3 months for completion. Evidently, 63% of all respondents completed their construction within 3 months, whereas 2% beneficiaries took more than 12 months period for completion.

5.2. Source of information and communication

5.2.1. Use of communication channels

Table 3 shows the distribution of the different communication challenges that respondents used in order to get the information regarding reconstruction. It can be seen that all four respondent groups had a wide range of media, tools and channels for receiving information on reconstruction, however, some tools were much more prominent that others. Additionally, the prominent source varies according to the group as well.

In case of implementation level respondents, social media and official websites were the most prominently used source of information for government (89%) and partner organization officials (88%) whereas local government representatives relied more on training/orientation events (89%) and local radio (78%) for information. Similarly, government officials used other sources sparingly while partner organizations used other sources as well, primarily training/orientations, television programs and newspapers/portals.

In case of reconstruction beneficiaries, among all communication sources, local radios were the most prominently used source of information by 73% of the respondents. Second to local radios, local government representatives were the primary source of information for beneficiaries. Other forms of information were also used, however, data suggest that person-to-person communication through government and partner organization officials and training or orientation activities were much more profound than telecommunication such as websites and phone communication, printed media such as IEC materials and newspapers or national level mass media channels such as national radio or television programs.

The bar chart in Fig. 1 illustrates the distribution of means of communication as per the level of education of beneficiary level respondents. It can be seen that medium of communication is vastly different among different groups, especially based on education. While 73% illiterate and 86% semi-literate respondents used local radios, the proportion decreased significantly among secondary (69%) and university level (22%) respondents.

Respondents with higher level of education chose to follow TV programs and social media/websites much more than lower education level respondents. 78% of the participants with university level of education use newspapers as source of information, very high compared to lower education levels. In all cases, very few of the participants use the phone inquiries or messaging to be informed on the issues of reconstruction.

5.2.2. Type of information vs sources

The data in Table 4 elaborates the distribution of sources from where beneficiaries specifically received three major types of information on reconstruction; policies, financial (inspection and tranches) and technical (construction technology). Respondents relied more on PO officials (75%) and government officials (60%) for earthquake resistant construction techniques, while for information on reconstruction policies and tranche disbursement, local representatives (68%) were widely sought after.

5.2.3. Channels for two-way communication

A key component of communication is the ability and mechanism of two-way communication, primarily in addressing queries and issues from

Table 1
Distribution of beneficiary level survey respondents.

District	Construction status			Level of education					Total
	Complete	Under const.	Not Started	Illiterate	No formal education	Primary	Secondary	University	
Dhading	71	3	1	19	11	21	22	2	75
Dolakha	114	2	2	15	51	19	28	5	118
Kathmandu	21	9	–	3	7	5	13	2	30
Nuwakot	49	2	–	11	12	17	11		51
Total	255	16	3	48	81	62	74	9	274

Table 2
Distribution of time taken by beneficiary respondents for completion of construction [N = 255].

Months	0–1	1–2	2–3	3–4	4–5	5–6	6–7	7–8	8–9	9–10	11–12	>12	Total
f	47	72	43	22	9	21	7	4	1	1	22	6	255
%	18%	28%	17%	9%	4%	8%	3%	2%	0%	0%	9%	2%	100%

Table 3
Distribution of frequencies of different media of mass communication used by different respondent groups.

Communication channels	Reconstruction beneficiaries	Government officials	Local representatives	PO officials
A. Mass media				
i. Local radio	**201 (73%)**	4 (22%)	21 (78%)	9 (36%)
ii. National radio	61 (22%)	2 (11%)	14 (52%)	8 (32%)
iii. Television programs	105 (38%)	6 (33%)	20 (74%)	17 (68%)
B. Printed media				
i. IEC materials/Notices	44 (16%)	6 (33%)	15 (56%)	18 (72%)
ii. Newspapers/Portals	14 (5%)	8 (44%)	11 (41%)	18 (72%)
C. Telecommunication				
i. Phone Inquiry/messaging	24 (9%)	6 (33%)	14 (52%)	14 (56%)
ii. Social media/Websites	33 (12%)	**16 (89%)**	18 (67%)	**22 (88%)**
B. Person-to-person communication				
i. Local representatives	**194 (71%)**	–	–	–
ii. Community people/Masons	59 (22%)	–	–	–
iii. Government officials	121 (44%)	–	–	–
iv. PO/NGO officials	193 (70%)	–	–	–
e. Training/Orientation activities	106 (39%)	10 (56%)	**24 (89%)**	19 (76%)

The bold signifies highest values.

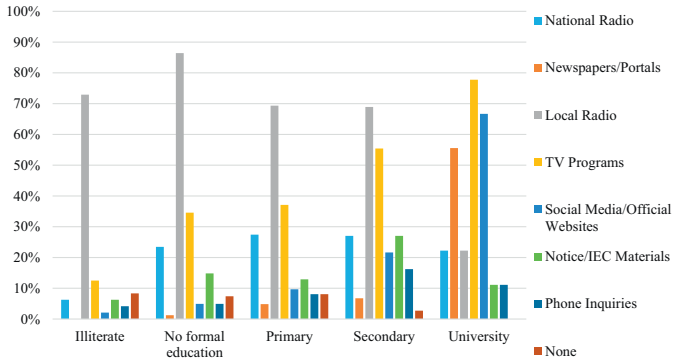

Fig 1. Distribution of means of communication among different level of education of beneficiaries.

Table 4
Distribution of major source of information according to type of information [N = 274].

	Govt. officials	Mass media	PO officials	Local representatives	Social media/Websites	Notice/IEC materials	Awareness activities
Reconstruction policies	147 (54%)	31 (11%)	146 (53%)	**189 (69%)**	15 (5%)	19 (7%)	52 (19%)
Inspection and tranches	159 (58%)	33 (12%)	152 (55%)	**185 (68%)**	9 (3%)	20 (7%)	58 (21%)
Construction technology	165 (60%)	34 (12%)	**207 (76%)**	159 (58%)	17 (6%)	26 (9%)	91 (33%)

The bold signifies highest values.

the information recipient. Table 5 below presents the distribution of different focal points where beneficiary respondents placed their queries and issues regarding reconstruction for solutions.

The distribution clearly indicates that among the various available options, local government representatives and social leaders were the most sought after when beneficiaries had any queries regarding reconstruction (89%). This was followed by government officials (54%), partner organization officials (47%) and community people (11%). Much of the beneficiaries stated that they did not quite directly correspond to mass media to place queries or issues.

Additionally, when asked if they had used the toll free number activated by NRA to ease people in asking the confusions and collect grievances, 217 (79%) of all respondents stated that they did not know about it at all, 18% stated that they had heard of it but not used while only about 3% of the respondents stated that they had used it multiple times.

The results in sections above clearly outline the variation in communication media and channels used by different target groups during the post-earthquake reconstruction campaign in Nepal. At the beneficiary household or community level, localized sources of information were highly used whereas implementation level groups used other variety of

Table 5
Frequency distribution of major focal points for placement of issues (N = 274).

	Government officials	mass media	PO officials	Local representatives/Social leaders	Family	Community people	None
f	149	2	128	243	12	29	5
%	54%	1%	47%	89%	4%	11%	2%

sources as well. This is particularly true as the earthquake affected communities, especially in the rural areas with lack of transportation access or cable television, are highly dependent on local sources for all sorts of information and daily updates. Additionally, earthquake affected communities across the country also varied largely in socio-economic, cultural and topographical status as well as in capacity, advantages and problems (for example, an earthquake affected house owner in the heart of Kathmandu City would have issues of land management, and thus would require specialized information on resolving land issues whereas a house-owner in a rural village would have issues with understanding technical details, and thus would seek information on construction). This variation, especially in an owner driven reconstruction approach, results in unique challenges and issues, which require micro-level coverage that national level information channels cannot undertake adequately. Similarly, it is also seen that beneficiaries are not adequately informed the different channels of communication available (such as the toll free number) and how to access them.

Among various types of communication sources, local media and person to person communication involving government and partner organization officials, local representatives or awareness activities was more prominent source of information than national mass media, telecommunication and online sources. It can also be seen that earthquake affected beneficiaries with different education levels prioritized different communication channels and beneficiaries with higher level of education received information from multiple sources, as opposed to that with lower education levels. This points to the need to prominently invest in and capacitate local information sources in scrutinizing, handling and disseminating information. Similarly, person-to-person communication must be included as a major component of communication channels. Furthermore, with different groups of organization and people having more or less equal weightage on information sharing to beneficiaries, any misunderstanding of information or biasness in any of these sources could create conflicts and confusion among beneficiaries. This is especially true in a large scale reconstruction activity, where changing political and social environments, updated information and emerging issues creates a dynamic environment, with frequent changes in policies.

5.3. Perception of information quality

To understand the perception of different target groups towards the quality of information received during the reconstruction process, respondents were asked to rate their level of satisfaction on two aspects of communication, (i) timely reception of information and (ii) clarity in the information received. The Table 6 below highlights the results from the data analysis.

Results show that the perception regarding quality of information received varies widely among the respondent groups. While all of the government officials said they either agree (78%) or strongly agree (22%) on receiving timely information, in case of local representatives, 22% disagreed on having received information on time while another 30% remained neutral. Equal proportion of local representatives strongly agree on receiving timely information. This shows the disparity in timely dissemination of information among the local government units. Among the partner organization officials however, majority of the respondents (80%) agree or strongly agree on having received timely information. Likewise, half of the beneficiary respondents agreed to having received information regarding reconstruction on time (17% strongly agree and 32% agree). 23% of them disagree that they have received reconstruction information and messages on time whereas 8% strongly disagree on the same. In summary, it is seen that half of the respondents were satisfied with timely information sharing while the other half were not.

Similarly, the respondents were also surveyed regarding their perception on the clarity of information received from various sources whereby only 29, 16, 19 and 28 percentages of beneficiaries, partner organizations, local representatives and government officials respectively strongly agreed that they were able to receive and clearly understand all information regarding reconstruction. Among beneficiary respondents, 31% disagreed to having received clear information on reconstruction. Across all four respondent groups however, it is seen that the respondent satisfaction towards clarity of information is much lower than the timely reception of information.

To ascertain the gaps between these perceptions, policy and implementation actors were also asked to state their level of satisfaction in disseminating timely and clear information to beneficiaries. More than 75% of the policy level actors and 65% of the implementation level actors agreed or strongly agreed that the communication initiatives undertaken during reconstruction was able to provide timely and clear information to beneficiaries. On the other hand, less than half of the beneficiary level respondents agreed to have received clear information on time as shown in Table 6.

Furthermore, the data in Table 7 depicts the perception of quality of information received by beneficiary level respondents against the number of communication channels that they had access to. The results are based on the number of channels out of the twelve that beneficiary level respondents stated to have access to in Table 3 above. In general, it is seen that with an increase in the number of channels that beneficiaries used for information, the perception of beneficiaries regarding the quality of information improved.

Most significantly, among the 52 beneficiary respondents who had access to only up to two channels, a majority of respondents were either

Table 6
Respondent satisfaction to two major aspects of communication in reconstruction.

Respondents	Parameter	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Government officials (n = 18)	Time	0 (0%)	0 (0%)	0 (0%)	14 (78%)	4 (22%)
	Clarity	0 (0%)	2 (11%)	2 (11%)	9 (50%)	5 (28%)
Local representatives (n = 27)	Time	0 (0%)	6 (22%)	8 (30%)	6 (22%)	7 (26%)
	Clarity	0 (0%)	2 (7%)	8 (30%)	12 (44%)	5 (19%)
PO officials (n = 25)	Time	0 (0%)	2 (8%)	3 (12%)	17 (68%)	3 (12%)
	Clarity	0 (0%)	3 (12%)	5 (20%)	13 (52%)	4 (16%)
Beneficiaries (n = 274)	Time	21 (8%)	62 (23%)	56 (20%)	88 (32%)	47 (17%)
	Clarity	29 (11%)	54 (20%)	61 (22%)	51 (18%)	79 (29%)

Table 7
Perception regarding timely reception and clarity of information based on the number of communication channels that beneficiaries had access to [N = 274].

No. of channels	Parameter	Strongly agree		Agree		Neutral		Disagree		Strongly disagree	
		f	%	f	%	f	%	f	%	f	%
1–2 [n = 52]	Time	5	10%	15	29%	7	13%	21	40%	4	8%
	Clarity	8	15%	11	21%	11	21%	15	29%	7	13%
3–4 [n = 117]	Time	13	11%	37	32%	32	27%	28	24%	7	6%
	Clarity	25	21%	24	21%	32	27%	23	20%	13	11%
5–6 [n = 72]	Time	15	21%	24	33%	14	19%	11	15%	8	11%
	Clarity	29	40%	12	17%	11	15%	14	19%	6	8%
7–8 [n = 23]	Time	8	35%	9	39%	3	13%	2	9%	1	4%
	Clarity	11	48%	2	9%	7	30%			3	13%
9–10 [n = 8]	Time	4	50%	3	38%					1	13%
	Clarity	4	50%	2	25%			2	25%		
11–12 [n = 2]	Time	2	100%				`				
	Clarity	2	100%								

neutral or stated that they did not think they received information on time (61%) or clearly (63%). At up to four communication channels, 59% of the 117 respondents remained neutral or agreed on having received information on time and clearly. With the increasing number of communication channels used, the proportion of beneficiaries who strongly agree on receiving quality information increases. At the apex, while only two beneficiary level respondents state to have been using all twelve channels of communication, both of them strongly agree on having received information on time and clearly.

While information may be disseminated through various channels, communication cannot be deemed effective unless the end-users for whom the information in developed and disseminated adequately gather, process and use the information for their benefits.

Results obtained from the data analysis above clearly state that different target groups perceived information differently. This variation resulted from two major reasons, (i) the communication channel that the respondents used did not adequately disseminate information and (ii) the information that was disseminated did not adequately correspond to the target group. For example, as most of the government and partner organization officials were adequately oriented and trained on regular basis regarding reconstruction policies and updates, they had a higher degree of satisfaction on quality of information. On the other hand, local government representatives were largely left out of such engagements. Similarly, information pertaining to beneficiaries such as technical standards was more widely and better propagated than information pertaining to local government representatives such as grievance handling, land management, tranche distribution or financing. Hence, while beneficiaries were satisfied to a degree on having received quality information, local representatives were significantly unsatisfied.

Additionally, a clear disparity can be seen between the source (policy level actors) and medium (implementation actors) with the destination (beneficiary level) in terms of the perception of quality of information disseminated. A reason this has resulted is the lack of a proper feedback mechanism, which would enable beneficiaries to report on any dissonance in communication to be collected and analyzed by policy and implementation actors to revise and strengthen their communication approaches.

Furthermore, the availability and use of multiple channels of communication is also crucial in obtaining clear information. Especially in the propagation of complex information, use of multiple sources is also required to increase credibility of the information. Results show that where beneficiaries were able to access reconstruction information from multiple communication channels, their perception of timely information and clarity increased. Hence, although local information sources are to be prioritized as stated above, these results points to the need of investing in and utilizing an assortment of communication channels for disseminating information, perhaps in a varying degree of prioritization.

5.4. Influence of communication on reconstruction

To ascertain the relationship between quality of communication and reconstruction, an analysis of the time taken for completion of reconstruction (no. of months) taken by beneficiary respondent was done against their perception regarding timely reception and clarity of information through media was done. The analysis was done using the data of 255 out of the 274 beneficiary respondents who had completed the construction of their houses at the time of this study.

Two individual models were developed for the study. Model 1 included analysis of satisfaction level on the timely reception of information and the Model 2 included satisfaction level on the clarity in information reception with the time taken for reconstruction completion respectively.

Responses were collected on a 5 point scale rated 1 as Strongly Disagree to 5 as Strongly agree for measuring the satisfaction level on timely reception of information & the clarity in information reception. Also for the time taken for construction completion, the responses were categorized into four categories; 1 month, 2 months, 3 months and more than 3 months. An ordinal logistic model was utilized for the analysis.

For the calculation of model fit, both the models have statistically significant chi-square statistics ($p < 0.050$); 31.324 for model 1 & 28.476 for model 2 with degree of freedom 2, which indicates that the final model gives a statistically significant improvement over the baseline intercept-only model.

Additionally, from the goodness of fit test, the null hypothesis is that model fit are good for both models. Here, $p = 0.79 > 0.05$ for model 1 and $p = 0.355 > 0.05$ for model 2, hence we accept the null hypothesis and conclude that the both model does fit the data well.

Also, from the pseudo R^2 Statistics, the values of Nagelkerke are 12.1% for Model 1 and 11.1% for Model 2 indicates that explanatory variables (timely reception of information and clarity in information reception) explain about 12% and 11% of the variation between the construction time period. This is just as we would expect because there are numerous others factors such as economic condition, availability of materials and labor etc. that impact on construction time period, many of which will be much more important predictors of attainment than any simple association with timely reception of information and clarity in information reception.

Table 8 presents the parameter estimates for the Model 1. There appears to be a relationship between the construction time period and the satisfaction on the timely reception of information through media. We can see the significant and positive coefficients for the months taken on completing the houses. When compared to responses of the time taken for the completion of the respondents, completion time taken in a month had Odds Ratio (OR) = Exp (Estimates) = Exp (1.483) = 4.404 (95% CI 0.857 to 2.109), p = 0.00 and in 2 months had Odds Ratio (OR) = Exp (Estimates) = Exp (1.157) = 3.18 (95% CI 0.625 to 1.689), p = 0.00 as compared to the time taken for completing the houses more than 3 months.

This implies that the respondents reconstructing their houses in one and two months were 4.4 and 3.18 times simultaneously more likely to satisfy on the timely reception of the information than those who were unsatisfied. This result was found to be statistically significant. For any rating level, people constructing houses in a month or 2 months have positive satisfaction (i.e. agree) about the timely reception of information than those who completed their houses taking more than 3 months.

Table 9 presents the parameter estimates of Model 2 corresponding to clarity of information received. There appears to be a relationship between the construction time period and the satisfaction on the clarity of the information used by media. We can see the significant and positive coefficients for the months taken on completing the houses. When compared to responses of the time taken for the completion of the respondents, completion time taken in a month had Odds Ratio (OR) = Exp (Estimates) = Exp (1.755) = 5.783 (95% CI 1.099 to 2.411), p = 0.00 as compared to the time taken for completing the houses more than 3 months.

This implies that the respondents reconstructing their houses in a month had 5.78 times more likely to satisfy on the clarity in the information reception than unsatisfied. This result was found to be statistically significant.

Table 8
Parameter estimates of the Model 1.

		Estimate	Std. error	Wald	df	Sig.	95% Confidence interval (CI)	
							Lower bound	Upper bound
Satisfaction level on the Timely Reception of Information	[time_score = 1]	−2.133	0.255	70.158	1	0.000	−2.633	−1.634
	[time_score = 2]	−0.432	0.168	6.652	1	0.010	−0.761	−0.104
	[time_score = 3]	0.510	0.168	9.162	1	0.002	0.180	0.840
	[time_score = 4]	2.235	0.221	102.369	1	0.000	1.802	2.669
Construction Time Period Taken	[months_for_completion_4cat = 1.00]	1.483	0.319	21.552	1	0.000	0.857	2.109
	[months_for_completion_4cat = 2.00]	1.157	0.271	18.192	1	0.000	0.625	1.689
	[months_for_completion_4cat = 3.00]	0[a]	.	.	0	.	.	.

Link function: Logit.
[a] This parameter is set to zero because it is redundant.

Table 9
Parameter estimates of the Model 2.a

		Estimate	Std. error	Wald	df	Sig.	95% CI	
							Lower bound	Upper bound
Satisfaction level on the clarity of the information	[clarity_score = 1]	−1.992	0.234	72.237	1	0.000	−2.451	−1.533
	[clarity_score = 2]	−0.556	0.168	10.889	1	0.001	−0.886	−0.226
	[clarity_score = 3]	0.450	0.167	7.276	1	0.007	0.123	0.777
	[clarity_score = 4]	1.329	0.186	51.152	1	0.000	0.965	1.693
Construction Time Period Taken	[months_for_completion_4cat = 1.00]	1.755	0.335	27.501	1	0.000	1.099	2.411
	[months_for_completion_4cat = 2.00]	0.467	0.260	3.217	1	0.073	−0.043	0.978
	[months_for_completion_4cat = 3.00]	0[a]	.	.	0	.	.	.

Link function: Logit.
[a] This parameter is set to zero because it is redundant.

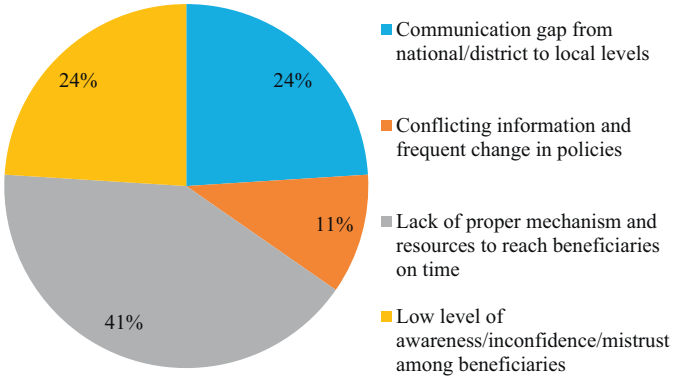

Fig 2. Top Challenges faced by implementation level respondents to provide credible and timely information to beneficiaries (N = 70).

For any rating level, people constructing houses in a month have positive satisfaction (i.e. agree) about the clarity of the information received than those who completed their houses taking more than 3 months.

Results above elaborate the relation between effective communication and reconstruction outcome. Where beneficiaries presented higher levels of satisfaction towards having received information on time and clearly, the time taken for the construction of their house significantly decreased.

5.5. Challenges in communication and information dissemination

Different channels, media and tools were designed and implemented by policy and implementation actors in disseminating information on reconstruction. However, owing to the disparity in the level of clarity and timely reception of information at the beneficiary as well as implementation level respondents, Fig. 2 depicts the key challenges faced by implementation level actors in effectively providing information to the beneficiaries.

As evident in Fig. 2, 41% of implementation level respondents stated that lack of proper mechanism and adequate resources was the major challenge in providing information to beneficiaries in time. 24% of respondent stated low level of awareness among beneficiaries. Another 24% of respondents stated communication gap between national, district and local levels whereas 11% stated conflicting information and frequent changes in policies.

Implementation actors primarily pointed out to the disparity in the source of information available and used and the accessibility of beneficiaries as the major hindrance in communication. Primarily, administrative information on reconstruction policies and grants were largely propagated through official notice boards, which were limited to the administrative center. Similarly, discrepancy in information shared, especially between the major stakeholders at the local level also created challenges. Implementation actors largely opined that they themselves received several information late, and lacking clarity due to communication gap between the different levels. This was especially highlighted by local government

representatives, who were unable to provide clear information to beneficiaries on issues such as grievance resolution and tranche disbursements. Furthermore, the level of education and awareness of beneficiaries also hindered information sharing, especially pointing to the diversity in language, culture and community perception towards the reconstruction program, policies and actors.

On the other hand, policy level target group opined that communication materials and contents were not developed as proficiently and easy way to understand. Lack of funding in communication was a major setback, as very few organizations had intensive and comprehensive communication programs, especially through mass media. This lack of funding also hindered in the coverage of local issues at the national levels. Similarly, uncoordinated efforts by different stakeholders at different levels created an ununiform flow of information, resulting in confusion and conflicts. Use of audio-visual medium of communication, such as television, was not as widespread as needed. Results shows that the information regarding changes in policies and norms were not propagated in the communities in time concurrently with implementation level actors stating that they themselves did not receive clear information on time. Confusion among beneficiary level respondents regarding reconstruction policies also stemmed from biased statements from political and social leaders about the reconstruction process. It indicates that proper information sharing and awareness activities are needed so that they could deliver right message without any political and personal bias.

6. Conclusion and recommendations

Results obtained from this study show that where beneficiaries perceived information on reconstruction to be available timely and clearly, the time taken for construction was significantly less. Although, such a perception is dependent on a number of factors, its correlation and impact on the reconstruction time period cannot be undermined, especially in an owner driven reconstruction approach, where successful reconstruction is largely dependent on the beneficiaries' ability to gather, process and utilize several forms of information towards construction of their houses. In a complex and dynamic process like post-disaster recovery, the integration of multiple communication channels through a comprehensive communication program would be the most suitable medium to increase outreach to a wide range of target groups. The following conclusions have been derived based on the results and discussions above.

(i) Communication strategy and programs are vital components of post-disaster recovery campaigns: Significant correlation can be seen between the reconstruction rate (time to completion) of earthquake reconstruction beneficiaries with respect to the effectiveness of communication and information shared and received at the community level. Thus, it is of paramount importance that communication and information dissemination is acknowledged as a major component of post-disaster recovery, especially where multiple stakeholders are involved. Considering the effect of timeliness of information dissemination, the study also points out to the need of developing communication strategies and programs immediately after, if not prior to, a disaster, with roles and responsibilities delineated to different stakeholders. However, strategies along cannot fulfill objectives, adequate resources must be allocated for developing and implementing comprehensive communication programs using suitable tools as discussed above in conjunction with such strategies. The government and partner organizations must allocate sufficient resources in communication.

(ii) Communication channels must be appropriate and wide: Effective communication in post-disaster recovery can be attained by complimenting large scale information dissemination through mass media with localized and specific information sharing through local radios, local governments and socio-technical assistance groups. Similarly, specific information must be propagated owing to the level of education, access to facilities and the needs and necessities of the target communities. The study comes with the conclusion that multiple sources and media of communication must be appropriately used to disseminate information, owing to the diversity of the end-users. Similarly, as interpersonal communication through local authorities and social leaders are the major source of information, they themselves need to be well informed on different aspects and facades of reconstruction. While national level policy actors have a greater reliance on national level mass media or social media as it provides better control on content, and appears to have a wider geographical coverage. However, it is far from sufficient. Localized media of information including local radios, community and social leaders, social mobilizers, field engineers and local governments bear the major role in disseminating information, hence enhancing capacities and as well as resources at these levels will inevitably increase the outreach of any reconstruction program.

However, considering the availability of resources, it might not be always practical to use variety of communication channels. Thus, a thorough study of the accessibility and suitability of channels and the socio-economic, demographic, cultural and linguistic status of the target group must also be examined properly to identify and use the most effective communication channel.

(iii) Monitoring, evaluation and feedback mechanism for quality control: Dissemination of credible information is another major aspect to be considered during a post-disaster recovery campaign. With multiple stakeholders involved, the risk of disparity of information shared arises. As effective communication strategy does not only include the effectiveness of the medium but also the final outcome, a responsive monitoring and evaluation plan is utmost necessary to identify gaps and challenges such as misinformation, biasness and confusion and formulate necessary strategies to overcome them. To achieve this, a strong monitoring and evaluation mechanism must be put in place. This mechanism must be implemented by the national governing authority, preferably with the use of third party monitors. Additionally, all information flowing out to the beneficiaries must be adequately reviewed by an authority, to provide credibility, most suitably through a one-door policy. However, this mechanism of control must not delay the process of dissemination of such information, as timeliness of information is as important as the quality. For this, the different levels of governments, at central, provincial and local, must be involved in the quality control mechanism.

Additionally, to avoid gaps in communication between the different tiers and stakeholders, an appropriate feedback mechanism, either in form of periodic satisfaction surveys and feedback collection, or through ground study of process and outcome will be necessary. A good initiative of this was the toll free number that was activated by the NRA, however, in lack of adequate information regarding this, beneficiaries were not able to use it to their full advantage. Such initiatives by the policy and implementation actors will provide much needed feedback for strengthening communication channels, and inevitably, the outcome of quality communication.

7. Limitations and further study

While this study evaluates the effectiveness of communication with respect to the perception of the end-users and its impact on reconstruction time period, it only covers the aspects of communication media and channels. Further study of organizational communication through the different tiers can be done to better evaluate the overall communication mechanism that the NRA and different partner organizations utilized during the reconstruction process. Similarly, in this study, time taken for completion of reconstruction is taken as a measure of reconstruction outcome, as it is one of the prime factors in determining success of a reconstruction program, and directly corresponds with the beneficiaries' ability to gather, process and utilize information in their rebuilding efforts. However, further study will also be required to understand the effectiveness of communication channels on other aspects of reconstruction, such enhancement of

awareness and capacity of communities, outreach of the implementation agencies and its impact on enhancing disaster resilience.

Declaration of Competing Interest

None.

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