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Assessing Satisfaction levels of the Earthquake Beneficiaries with the Post-disaster Private Housing Reconstruction Programme: Evidence from Nepal

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Abstract: Following the 2015 earthquake, Nepal embarked on an ambitious post-disaster housing reconstruction programme, constructing approximately 700,000 houses through the owner-driven private housing reconstruction (ODR) approach. This programme is considered as the largest owner-driven initiative globally. Inclusive policies in as the Socio-Technical Assistance programmes along with ODR approach was targeted to meet the unique needs of the most disadvantaged and vulnerable individuals who were disproportionately affected by disaster and encountered significant obstacles during the recovery process.

The primary objective of this mixed method study is to conduct a critical analysis of the satisfaction of the ODR-Socio-Technical Assistance for private housing reconstruction support program after eight years, for which a set of parameters were identified. Data were collected through a 304-questionnaire survey, interviews, and field observation. Detailed analysis of survey data was done through IBM SPSS 27.

The findings from the survey and interviews revealed that the satisfaction level of ODR-Socio-technical assistance (ODR-STA) led reconstruction efforts were equally distributed, consistent and unbiassed among the beneficiaries based on socio-economic indicators such as age, gender, ethnicity, religion, education, and vulnerability. In summary, only 2% respondents expressed dissatisfaction with the reconstruction programme. STA component is evidenced to have been tailored to the needs of vulnerable beneficiaries for the reconstruction and recovery endeavours.

Keywords: Gorkha earthquake 2015, Owner-driven reconstruction, Private housing reconstruction, Satisfaction, Vulnerable earthquake beneficiaries.

1. Introduction

Nepal experienced the Gorkha Earthquake on 25th April 2015, measuring 7.6 in magnitude. Tragically, the disaster claimed the lives of around 9,000 individuals. The impact of this catastrophic event extended to approximately eight million people, affecting nearly one-third of Nepal's population (NPC, 2015). Accordingly, Government of Nepal embraced the ODR as a *'default'* reconstruction strategy based on the successful internationally implemented model (Karunasena & Rameezdeen, 2010). Owner-driven reconstruction approach (ODR) was influenced by the valuable lessons learned from previous disasters in countries like Pakistan after the Kashmir earthquake of 2005 and India after the Gujarat earthquake of 2001.

Post-disaster reconstruction is a common behaviour of social norms and government intervention, therefore Government of Nepal established National Reconstruction Authority (NRA) to oversee the multi-sectoral reconstruction activities on 25th December 2016 (NPC, 2015). Post-disaster housing reconstruction aims to restore people's lives to normalcy. In this regard, Nepal embraced the principle of "Build Back Better" (BBB) as per the Sendai Framework for Disaster Risk Reduction (SFDRR) priority actions to rebuild lives by reducing vulnerability and enhancing resilience to mitigate the risks of future disasters (Lyons et al., 2010b; UNDRR, 2015; UNISDR, 2017; Ophiyandri et al., 2020).

Socio-Technical Assistance Module

Housing reconstruction in post-disaster context is critical and the role of the government is vital in guiding and encouraging households for self-recovery in various ways, such as (a) removing debris from building sites and streets, (b) providing training and technical assistance in communities to both men and women; and (c) providing financial incentives (GFDRR, 2017).

Government of Nepal identified over 800,000 earthquake beneficiaries to receive the grant of USD $ 3,000 and furthermore around 18,505 vulnerable beneficiaries under four different categories (refer Table 1) such as (i) Single women, (ii) Elderly/senior citizen, (iii) Person with disability and (iv) Minors underage of 16. In this study we have excluded minors due to ethical issues. NRA identified vulnerable beneficiaries to extend tailored support as 'socio-technical assistance component' (Karki et al., 2020) for the vulnerable individuals by providing such as (i) short training for masons, technical personnel, social mobilizers, carpenters etc ,(ii) Vocational training for masons, carpenters, plumbers and other construction

workers , (iii) Community based orientations for earthquake beneficiaries , (iv) Information centres, (v) Door to door technical, (vi) Demonstration construction, (vii) Community Reconstruction Committee (HRRP, 2019).

Overall objective in this research is to examine relationship between socio-economic indicators and satisfaction level of vulnerable earthquake beneficiaries in the post-disaster recovery settings. We have two major research questions as stated below.

1. What are the 'satisfaction levels' of the earthquake beneficiaries with regards to the post-disaster reconstruction endeavours?
2. Do they differ actors' gender, age, ethnicity, education and religion categories and vulnerability indicators? Using our database constructed from the primary survey quantitively we test the following research hypothesis.

   H1: There is no significant association between socio-economic/demographic categories including gender, age, ethnicity, age group and level of satisfaction of earthquake beneficiaries.

   H2: There is no significant association between vulnerable categories and level of satisfaction from the ODR-STA scheme of reconstructed houses.

In other words, we aim to assess whether the delivery of the ODR-STA program module intervention without any biases, prejudices, or discriminations based on humanitarian aid principle (European Commission, 2023). Our findings support both of above hypotheses.

2. Literature Review on Post Disaster Housing Reconstructions

This section focuses on the significance of housing reconstruction for disaster recovery, of the owner driven housing reconstruction (ODR) model that has been in practice since the 1970s. Despite five decades of research on post-disaster reconstructions little work has taken place on assessing the impacts of ODR and the tailored Socio-technical assistance programs to the vulnerable households in Nepal. Focus on how the level of satisfaction of the earthquake impacted individuals from their reconstructed houses vary by socio-economic and vulnerability has been ignored in the literature thus far (Shrestha et al., 2023), only limited empirical evidence were available in the context of Nepal. There is also need to explore the crucial humanitarian intervention component of ODR (Twigg, 2006; Peacock et al., 2007) in assessing the effectiveness and efficiency of interventions supporting shelter self-recovery (Maynard et al.,

2017). Moreover, evaluation of post disaster intervention and assessment of the effectiveness of these interventions has been relatively understudied area (Darcy et al., 2013; Dijkzeul et al., 2013). Hence, it is critical to assess the 'satisfaction' to generate about 'what works'(Proudlock et al., 2009:9) and to uncover unexplored outcomes or it impacts (Ganapati & Mukherji, 2014).

2.1. Definition of residential satisfaction

Housing is a basic important human need and right. According to United Nations Covenant on Economic Social and Cultural Rights, that includes "the right of everyone to an adequate standard of living for himself and his family, including adequate.....housing" (OHCHR, 1996-2022). Reconstruction of private houses is one of the critical aspects of the recovery stages after the disaster to rehabilitate the affected individuals in households or communities (Peacock et al.,2006; Rodríguez et al., 2007).

Housing is not only as individual's dwelling unit but consists of physical and social elements that they need for living (Francescato et al., 1987). Additionally, housing is a multidimensional phenomenon that encompasses various aspects such as the structural type such as (single-family home), tenure (ownership or rental), location , and political judication (Shlay, 1998).

In terms of satisfaction, it is a process of evaluation '*what was received and what was expected'* (Parker & Mathews, 2001). Similarly, satisfaction can be accurately defined as Campbell et al. (1976), perceived difference between one's aspiration and achievements, encompassing a range of feelings from a sense of fulfilment to a sense of deprivation. Furthermore, Williamson (1981) discovered that satisfaction is influenced not only by physical factors but also by the individual's capacity to form social networks and ultimately satisfaction is subjective reaction to an objective environment (Potter & Cantarero, 2006).

2.3. Post-disaster private housing reconstruction approach in Nepal

Owner-Driven Housing Reconstruction

The owner-driven reconstruction (ODR) is known as *'community-based' or assisted self-help'*, Build Back Better concept as per Sendai Framework for disaster risk reduction, is implemented with the support from national and international organizations to provide direct assistance to the house owner for the rebuilding of their damaged houses. Study by Barenstein (2006) provided evidence indicating

that residents' satisfaction with ODR and their ability to maintain disaster resilience in housing is highest when the house owners receive direct assistance for rebuilding of their damaged houses.

ODR approach is proven to be being more economical, faster, cheaper, most dignified and empowering towards reconstruction (Duyne Barenstein et al., 2010; Lyons et al., 2010a). ODR is evidenced to be promoted in the low-income households. For example, Davis (1978) highlighted self-help housing as the sole option for low-income groups in the absence of external aid following a disaster. This approach is evidenced to be most preferred even by the international organizations such as UN-Habitat and the World Bank after the 2004 Indian Ocean tsunami and the earthquakes in Pakistan 2005 and Haiti in 2010 (Davis, 2015). Accordingly, ODR guidelines was prepared by International Federation of Red Cross and Red Crescent Societies signifying an extensive consensus on the merits of the approach (IFRC, 2010).

2.4. Housing grants

In the post-disaster context, government encourages self-recovery in various ways such as (a) removing debris from streets and building sites, (b) providing training and technical assistance in communities to both men and women; and (c) providing financial incentives and safe construction practices (GFDRR, 2017). Aligned with the formal reconstruction Program and post-earthquake financing provisions, the government in Nepal provided financial aid to households affected by the earthquake. For those whose houses were destroyed, a sum of NPR 300,000 (approximately USD 2,600) was offered, while NPR 100,000 was allocated for retrofitting purposes. Additionally the cabinet announced an extra NPR 50,000 for vulnerable groups and homeowners residing in heritage areas, with the aim of incorporating cultural elements into their newly constructed houses (NRA, 2021).

2.5. Vulnerable households and socio-technical assistance component:

According to Flanagan et al. (2011a), social vulnerability refers to the socio-economic and demographic factors that affect the resilience of communities also that will negatively affect by environmental hazards" (Bolin & Stanford, 2006:9, 1998) and "the characteristics of person or group and their situation that influences their capacity to anticipate, cope with, resist and recover from the impacts of a natural hazard (an extreme natural event or process)" (Wisner et al., 2014).

Social vulnerability tends to differentiate the impact of a disaster on individual with different characteristics such as age, gender, race, education, income (Khunwishit & McEntire, 2012). Among these indicators the identified categories are senior population above 65 years of age and over, children under 5 years, disabled population, female households, less educated, unemployed, individual below poverty level and foreign born (Enarson, 2007).

Disaster management is often focusses on the physical hazard component but ignores the social vulnerability component or just focusing on different concept of vulnerability from different perspectives (Alwang et al., 2001) or the infrastructure vulnerability not giving much attention to social vulnerability when considering the vulnerability component. Disaster literature theorizes the individual, groups or communities form these segments are tend to experience higher level of disaster impact and possess greater degree of vulnerability (Bolin & Stanford, 2006; Khunwishit & McEntire, 2012). Moreover, the disaster causes severe impacts resulting in physical impacts (mortality, morbidity, property damage) (Fothergill et al., 1999; Lindell & Prater, 2003). Also, can cause social impacts: psychology impact (anxiety, grief, depression, trauma, emotional stress etc.), socio-economic impact (property damage causing direct economic impact in the form of a loss in value of assets) (Lindell & Prater, 2003). Moreover, vulnerability to hazards is induced by several factors such as age, income, social networks and also the neighbourhood characteristics that can negatively contribute the poor or the more vulnerable groups before and after disaster (Flanagan et al., 2011b).

Table 1: Vulnerable houseowners identified by NRA

Vulnerability Type	*No. of houseowners*
Single women	9024
Senior citizens/elderly (above 70)	9147
Persons with disability	243
Orphan children (below 16 years)	91
Total	18,505

Source: Household registration for housing reconstruction survey, 2016-17,CBS (Rawal et al., 2021)

2.6. Theoretical Context and Conceptual Framework

2.6.1. Maslow's Hierarchy of Needs in the Context of Post-disaster Housing Provision

Housing is very important for human being's survival as a basic need for the long-term physical well-being. Housing, along with food and water, is considered an

essential immediate basic need. Abraham Maslow's Basic Needs Theory, formulated in 1943, emphasizes the stages of human growth and identifies six terms that describe the progression of human motivations.

These stages include Physiological, Safety, Belongingness and Love, Esteem, Self-Actualization, and Self-Transcendence needs, which illustrate the typical pattern of human motivation (A.H.Maslow 1943). Several housing-related studies suggests that residential spaces are designed to cater to varying levels of quality expectations. Scholars like Banham (2007) and Oliver (2006a) proposed a classification of residential spaces into three distinct levels: shelter, house, and home. While a house serves as a physical structure, a home encompasses much more, extending beyond mere physicality, as emphasized by (Oliver, 1978; Bachelard & Jolas, 1994).

Similarly, study by Jordan (2015) also highlights that it is critical to meet the Disaster Survivor Hierarchy of lower needs are to first to be met even from mental health perspective in disaster, that consists of six hierarchical needs, which are as follows: (1) Food, water, and shelter; (2) Safety; (3) Family and friends support; (4) Stress reaction; (5) Grief and loss; and (6) Assimilation and accommodation. The process of disaster recovery can be intricate and demanding, particularly when essential resources are scarce or completely lacking (A.H.Maslow 1943; Jordan, 2015). In the aftermath of a disaster, where lives, property, and community are devastated, the challenges of displacement and finding adequate shelter can further exacerbate the situation. Disaster survivors not only have disaster-specific needs, such as medical attention following a school shooting, but also fundamental core needs, including access to water, food, shelter etc.

Example: Quotation extracted from the field primary data.

"……. I lost everything in earthquake including my little valued possession home, where I had built memories …lost whatever little I had stored such as food, clothing, utensils…etc. I feel lost as I have been living on my own…. All I wanted was a roof over my head and be safe to re-live my life again until my last breath" (personal conversation with the disaster survivor-Elderly male above 70 years, July 2022)

……I finally have my new home it is more than just four walls…I feel happy to have new house whatever shape or size. I could build through grant and technical support from the government and others….it has given me new sense of security and privacy in rebuilding my life again after disaster. I was unable to build immediately on my own due to my physical issues…. (Person with disability, July 2022).

…. Having lost it all and living in temporary makeshift tents before having new built house, made me realised how important having a home means. With destroyed house I felt I lost my identity linked with the house …. they used to call earlier 'talla ghare sarkini bajai ko ghar' (sarkini grandma's house) … (Elderly women, August 2022)

Numerous studies in the field of housing have shown that residential properties are designed to meet varying levels of expectations (Rapoport, 2000; Jusan, 2010; Zavei & Jusan, 2012). These studies by Miller-Lane (2007) and Oliver (2006) propose a classification of residential spaces into distinct levels, including shelter, house, and home. An adequate dwelling is recognized as a fundamental human right, as stated in Article 25 of the Universal Declaration of Human Rights.

Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability ,widowhood, old age or other lack of livelihood in circumstances beyond his control (United Nations, 2015:52)

This definition implies a strong connection between a house and the health and well-being of individuals. Therefore, a house is inherently tied to "more than four walls and a roof" (OHCHR & UN-Habitat, 2009:3) rather, it is a " *a complex asset ,with links to livelihoods , health, education, security and social and family stability*"(Barakat, 2003:1).

A home extends beyond the confines of a physical structure, setting it apart from a mere house (Bachelard, 1994; Oliver, 2006). Shelters are primarily offered for protection and safety, while the creation of a home signifies profound social structures. As per Oliver (2006), the term 'house' denotes a physical structure, referring to a small dwelling, while 'home' carries a connotative meaning. Home symbolizes the experiences and life within it, representing the underlying social structures and the family's connections to the domestic environment it encompasses.

On the other hand (McCray & Day, 1977) conducted a study aiming to explore housing-related values, aspirations, and satisfaction based on Maslow's Hierarchy of Needs. The research involved two groups: low-income rural residents living in private houses and low-income urban residents residing in public housing.

The post-disaster reconstruction is critical in through adopting appropriate housing reconstruction strategy by embracing the socio-economic, socio-cultural and social needs together with long-term disaster mitigation and sustainability (Aysan & Davis, 2013) and addressing the complex and conflicting requirements

of the intended beneficiaries (Kishore, 2000). Whereas, the previous study have highlighted that the reconstruction program often fail to take in consideration of the needs and requirement of the intended beneficiaries as the newly constructed facilities become obsolete from the day the reconstruction is completed (Barakat, 2003; Ratnayake & Rameezdeen, 2008).

The overall reconstruction program or **Sri Lanka** with respect to the comparative study of Donor Driven vs Owner Driven Programme (ODP) by Ratnayake and Rameezdeen (2008)-findings suggest that the beneficiaries were satisfied in Owner Driven Program (ODP) due to it was cost-effective, efficient and better quality of construction instead of Donor Driven Program.

Similarly, lessons from **Indonesia's post-disaster reconstruction**, 2004 in the case Indonesia, both approach is applied in terms of Donor Driven approach and Owner Driven approach (Wegelin, 2006; Ratnayake & Rameezdeen, 2008). But, Ophiyandri et al. (2010) study showed that there were issue of construction quality affected due to which beneficiaries were unsatisfied as the process did not address their needs and requirements, less community level participation and accountability.

Moreover, the lessons from the **India's 2001, Gujarat** post-disaster owner-driven reconstruction program led by the Gujarat government with support from the various stakeholders such as national, international governmental and non-governmental organizations in 'public private partnership arrangement. The findings suggested ODR program had over 94.5% household beneficiaries satisfied with the reconstruction (Barenstein, 2006).

Moreover, Lessons from **Iran's Bam's Earthquake,2003**- The findings of Fallahi (2007) citing (Razani 1984, Pasa 1985, Rafyie and Niroomand 1986;Zargar 1988,Fallahi 1996) showed housing reconstruction projects implemented in Iran past four decades depicted that the houses reconstruction as partially successful in meeting people's rebuilding needs but also ignored the local community participation process.

Moreover, study by Steinberg (2007) stated the importance of providing a socio-economic infrastructure along with the feeling of being a "neighbourhood' and importance of social relations important factor by (Ruwanpura, 2009) which was found to be ignored in post-disaster housing also backing the basic needs theory of social needs. Similarly, study by Buckle and Marsh (2002) stated that agencies need to recognise and consider complex social, spatial and architectural thought to address social or historical inequities and foster cultural transformation.

2.8. Conceptual framework of post-disaster housing satisfaction

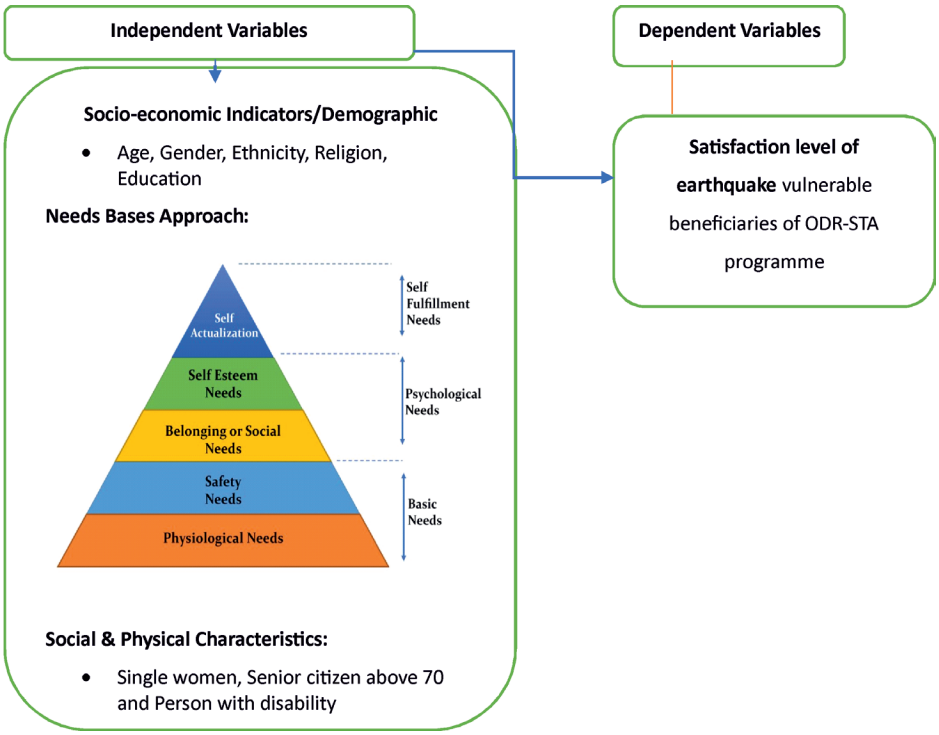

Figure 1: Conceptual framework for needs-based post-disaster housing satisfaction

Section 4.2.1 contains testing these theories by the data constructed from the sample survey.

2.9. Basic Needs Theory

Maslow's theory of human motivation (A.H.Maslow 1943) defines human endeavours as an attempt to fulfil a hierarchy of needs (Yawson et al., 2015) as listed below;

I. Self-actualization: ability to maintain or recover well-being after disaster
II. Self Esteem Needs: need for self-respect (social recognition of one's achievement, status)
III. Social needs/Belonging: need for affection and emotional support.
IV. Safety Needs: relate to need for protection from harm or shelter.
V. Physiological Needs: Food, water, health, clothing, and shelter

2.10. Socio-Demographic Characteristics of Residents and satisfaction

The above depicted conceptual framework is based on the literature review and focus on basic need's theory perspective, and satisfaction with respect to the socio-demographic characteristics of households. Numerous empirical studies have been conducted to identify significant factors related to residents' characteristics, including age, income, duration of residence, and homeownership (Lu, 1999). Accordingly, study conducted by several authors (Lu, 1999; Oswald et al., 2003; Pinquart & Burmedi, 2003; Chapman & Lombard, 2006; Baum et al., 2010) showed that age has a positive impact on residential satisfaction as older individuals are found to exhibit higher levels of satisfaction with their housing as compared to younger individuals (Weidemann et al., 1989).

Mohit et al. (2010) argued that age of the household is negatively corelated with housing satisfaction. Moreover Vera-Toscano and Ateca-Amestoy (2008) study a correlation between higher educational attainment of household heads and increased housing satisfaction. Previous research by Campbell et al. (1976) and Pruitt (1978) also found a positive relationship between housing satisfaction and age, income, education and job status. However (Lu, 1999) found the impact of education on housing satisfaction appears to be insignificant. Yet, it should be noted that residential satisfaction based on socio-demographic characteristics exhibits variability both positive and negative, across different countries/cultures and is not conclusive (Mohit & Raja, 2014).

The ODR approach is found to positively support in addressing pre-existing inequalities i.e., negotiation, skills, confidence, and unity among the owners. Besides, the Owner-driven reconstruction approach is found not to address pre-existing vulnerability of the owners as the implementation of programs are based on position of the agencies in overall equity issues (Barakat, 2003; Alam, 2010). Furthermore, according to Karki et al. (2022) their study asserts that the newly constructed houses were deemed unsuitable for their intended purpose due to their inadequacy, unsuitability for the local climate, and impracticality for everyday rural life.

3. Description of the Study Area and methodology

3.1. Research motivation, geographical locations, and participants

The author's research interest stems from their personal experience of witnessing the devastation and loss caused by the 2015 Nepal Earthquake. This experience

motivated them to gain a deeper understanding of the experiences of the most impoverished and marginalized individuals, the impacts of the earthquakes on them, and their recovery processes. As a result, this paper is part of a series that examines the effectiveness of post-disaster reconstruction, specifically focusing on vulnerable households identified by the government in the aftermath of the 2015 Nepal Earthquake.

The study was conducted between May 2022 -July 2022 in the districts of Gorkha covering both two Urban municipalities and Rural municipality- (i) Gorkha Urban Municipality (ii) Palungtar Urban Municipality and (iii) Sulikot (Barpak) Rural Municipality. The research participants were purposefully selected based on the National Reconstruction Authority's identification of vulnerable households. Additionally, interviews were conducted with government officials and humanitarian and development professionals from international and non-governmental organizations (I/NGOs).

Epicentre in Gorkha (April 25, 2015)

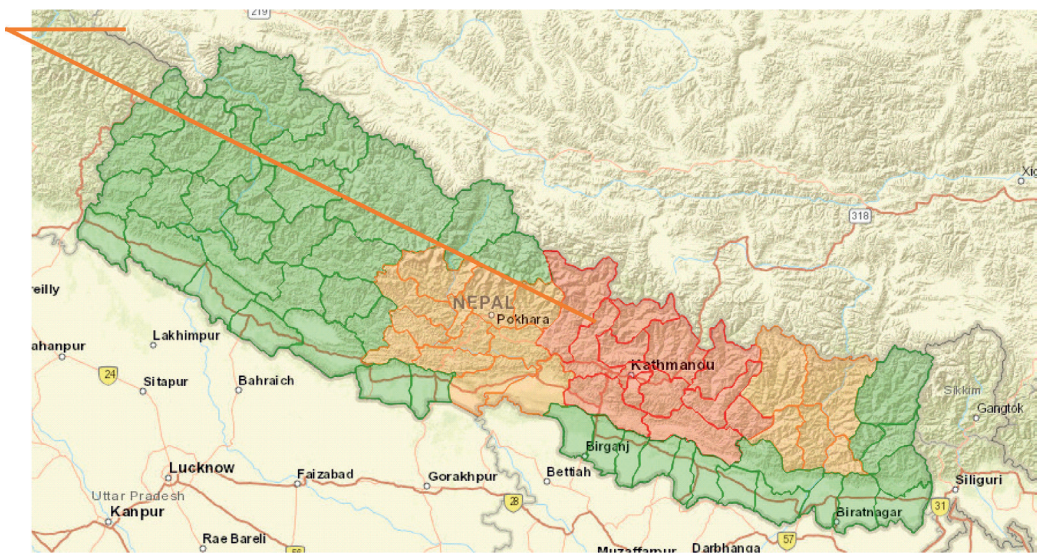

Figure 2: Map of Nepal (Source: https://ehrpmis.nra.gov.np/GIS)

3.2. Research paradigm and data collection methods

A mixed method case study approach embracing both quantitative and qualitative approach was considered to assess the satisfaction level of vulnerable households as stated as 'beneficiaries' to explore the relationship between socio-economic and

demographic characteristics and satisfaction. A focused examination was conducted on a limited number of cases to thoroughly investigate their intricate circumstances and comprehend the intricate network of meanings that they entail through conducting 304 surveys from vulnerable households and 48 in-depth interviews.

The research employed diverse methods to gather data, including the utilization of paper-based questionnaires for surveys, conducting qualitative interviews in person and online via platforms such as Zoom, Microsoft Teams, and telephone. Furthermore, secondary data and grey literature, such as policy documents, project reports, and organizational reports, were also utilized in the study in order to triangulate the findings (Mathison, 1988; Creswell, 1999; Yin, 2003).

A total of forty-eight qualitative interviews were undertaken, involving various participants including vulnerable households, humanitarian, and development professionals from international and national non-governmental organizations (I/NGOs), governmental representatives, banks and financial institutions, policy makers, politicians, technical experts, and consultants.

The research obtained ethical approval from the researcher's university. To protect the confidentiality of the research participants, pseudonyms were employed.

3.3. Sample size calculation

The survey was conducted among affected vulnerable households identified by the Government of Nepal, National Reconstruction Authority. According to the National Reconstruction Authority Data, total 18,505 were identified as vulnerable earthquake beneficiaries nationwide under four different criteria as listed sampling filter,but study excluded minor. Out of these 1431 were identified as vulnerable beneficiaries in Gorkha District (NRA, 2020). The sample size was based on statistical principle – it was calculated by considering the total population (N) = 1431, 95% confidence level (Z value), 5% margin of error (e value), 50% prevalence (p value). From the calculation, the sample size becomes 304 for questionnaire survey.

3.4. Sampling Filter

Three categories of vulnerable households were selected as respondents.

1. Senior citizens above 70 years
2. Single women above 65 years
3. People living with disabilities (red or blue cardholders)

3.5. Sample selection techniques

Cluster random sampling techniques were used to select the respondents for questionnaire survey. Besides that, purposive sampling techniques was used for the qualitative data from interviews and focus group discussions.

3.6. Data collection tools and techniques

Data collection tools: survey questionnaire was used in quantitative data collection. Thereafter the pen-paper forms of survey data were entered in JISC online software manually to maintain the quality of data**.** Interview checklist was used for the collection of qualitative data.

3.7. Data Analysis Techniques

Quantitative data analysis: Statistical software package (SPSS), IBM AMOS was used for the quantitative data analysis and structural equation modelling. Basically, the study conducted the descriptive analysis, and chi-square test. In terms of qualitative data analysis NVivo software was used for Content analysis, and thematic analysis. Conclusion was drawn based on the findings of both types of data.

4. Results and Discussions

One of the main dependent variables of this study is the level of satisfaction of respondents. The study assessed their level of satisfaction from the STA program intervention during reconstruction through governmental and non-governmental organizations.

Table 2: Level of Satisfaction from Reconstructed Houses under the ODR -STA

Satisfaction					
		Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
Valid	Unsatisfied	6	2.0	2.0	2.0
	Satisfied	169	55.6	55.6	100.0
	Very satisfied	129	42.4	42.4	44.4
	Total	304	100.0	100.0	

The data presented in Table 2 shows that majority of people (55.6%) were satisfied followed by 42.4% were very satisfied, whereas 2% were unsatisfied. In summary, over 98% of the respondents were found to be satisfied from ODR-STA program interventions.

Even during the several interviews and focus group discussions held during the field visit after the quantitative survey respondents were found to be satisfied with the provided support and some of the stated quotes from them are stated below:

"……. I feel very grateful and have full gratitude in having someone there to support me with providing financial support and technical support to build my house, as I do not have anyone to look after me and live alone so not able to oversee the reconstruction process '(Respondent1, Single women 67 years old)

"……I live on my own, my husband died many years ago and I could not bear any children so did not have any family to take care, even due to my inability to bear children I was looked down from society and extended family so did not have anyone to support. I am not well educated to understand the reconstruction process of managing documentations and negotiate the rate.STA program from government and other organization was very supportive without this I could not have built on my own" (Respondent 2, Senior citizen ,74 years old)

"…. Due to my disability, I was not able to build my house on my own, could not manage to get laborer on time, construction materials were expensive to manage and go to bank to obtain grant. STA program supported in expediting my reconstruction and complete the process by arranging assistances. I am satisfied to whatever I received as support it benefited me a lot. (Respondent 3, Elderly differently abled, 79 years old)

Although the respondents were found to be satisfied with overall ODR-STA program, there were some short-comings uncovered from qualitative study nevertheless as quantitative analysis may restrict the respondent's response on elaborate issues discussed in next series of papers following up with this study . Such as limited grant amount, not being able to build desired rooms, space, less adherence to socio-cultural traditional homes, expensive construction materials and labor, quality of the house, communication issues (Suvedi, 2020), access to finance, not being able to obtain technical help (Lam, 2022), not able to be identified as vulnerable (Rawal et al., 2021) and financial support on time. Likewise, earlier findings by Ophiyandri et al. (2010) also evidenced similar issues as per this study such as scarcity of human resources, bureaucratic and institutional issues, lack of coordination among organizations, road accessibility, construction quality etc. contributing to dissatisfaction of need and requirements not addressed.

In general context of Nepal with a joint family living context most of the respondents were found to have built 2 rooms (164 respondents) or, 3-4 room house (87 respondents), or house with more than 4 rooms (17 respondents) or a one room house (36 respondents). Majority of respondents were found to desire bigger space to accommodate family members to celebrate festivals and to maintain socio-cultural aspects. Therefore, these space needs must be considered to make future ODR-STA more tailored and sustainable while maintaining disaster resiliency measure in the future.

4.1. Association between socio-demographic variables and satisfaction

4.1.1. Does Satisfaction Rate Vary by Gender?

Another objective of this study is to analyze the association between the gender and level of satisfaction of earthquake beneficiaries. The data presented in (Table 3) shows that in total only 2% people were unsatisfied otherwise 98 % were satisfied from the socio-technical assistance module implemented by government of Nepal and other agencies for reconstruction. The level of satisfaction between male and female beneficiaries was almost similar.

Table 3: Satisfaction Rate and Gender

		Gender		*Total*
		Male	*Female*	
Satisfaction	Unsatisfied	2.1%	1.9%	2.0%
	Satisfied	55.2%	55.8%	55.6%
	Very satisfied	42.7%	42.3%	42.4%
Total		100.0%	100.0%	100.0%

Chi-Square Tests

	Value	*df*	*Asymp. Sig. (2-sided)*
Pearson Chi-Square	.015[a]	2	.993

There is no significant difference between male and female regarding the level of satisfaction from the socio-technical assistance received from Nepal government and other agencies because statistical p-value of Chi-square test is .993 which is greater than .05 significant level, which indicates that male and female were equally satisfied. The decision from this test is to accept the Hypothesis no 1.

4.1.2. Does Satisfaction Rate Vary by Ethnicity?

Preliminary report of Census 2021 data shows about 142 castes and ethnic groups reside in Nepal now in contrast to 121 groups in 2011 census(NPC, 2012). More than 60 caste groups were found in Gorkha district (study district) so it shows the cluster of multi-caste and ethnicity (National Statistics Office, 2023).

Does the level of satisfaction from the service received during reconstruction after earthquake differ across these ethnic groups? The study tried to contrast the level of satisfaction across different ethnic groups. The data presented in Table 4 shows that comparatively higher number (45.8%) Dalit were very satisfied compared to only 25% who did not state their caste and 28.6% Muslim. Whereas, 7.1% Muslims were unsatisfied followed by 2.9% Brahmin/Chhetri people, and 1.4% Adhibasi/Janjati.

Table 4: Satisfaction Rate and Ethnicity

		Ethnicity						*Total*
		Adhibasi/ Janjati	*Brahmin/ Chhettri*	*Dalit*	*Newar/ Thakali*	*Muslim*	*N/A*	
Satisfaction	Unsatisfied	1.4%	2.9%			7.1%		2.0%
	Satisfied	53.5%	54.7%	54.2%	60.7%	64.3%	75.0%	55.6%
	Very satisfied	45.1%	42.4%	45.8%	39.3%	28.6%	25.0%	42.4%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Chi-Square Tests								
			Value		Df		Asymp. Sig. (2-sided)	
Pearson Chi-Square			6.085[a]		10		.808	

There is no significant difference across ethnic groups in the level of satisfaction from the socio-technical assistance received from Nepal government and other agencies as was the case between male and female. Statistically p-value of Chi-square test is .808 which is greater than .05 significant level, which indicates that the level of satisfaction of all caste groups were found similar. There was no effect of ethnicity on their level of satisfaction in relation to the service received during reconstruction. The decision from this test is to accept the Hypothesis no 1.

4.1.3. Does Satisfaction Rate Vary by Religions?

According to the 2011 Census, Hinduism was followed by 81.3 % of the population. Buddhism, Islam, Kirat, Christianity and Prakriti are followed by 9% ,4.4% , 3.1%, 1.4 % and 0.5 % of the population, respectively (NPC, 2012).

There is no significant difference in level of satisfaction from the socio-technical assistance received from Nepal government and other agencies across religion of beneficiaries, see (Table 5). In this case statistical p-value of Chi-square test is .568 which is greater than .05 significant level, which indicates that the respondents of different religious group were equally satisfied from the service received during reconstruction. The decision from this test is to accept the Hypothesis no 1.

Table 5: Satisfaction Rate and Religion

		Religion				*Total*
		Buddhist	*Christian*	*Hindu*	*Islam*	
Satisfaction	Unsatisfied			1.9%	7.7%	2.0%
	Satisfied	60.0%	64.3%	54.3%	69.2%	55.6%
	Very satisfied	40.0%	35.7%	43.8%	23.1%	42.4%
Total		100.0%	100.0%	100.0%	100.0%	100.0%
Chi-Square Tests						
		Value		Df	Asymp. Sig. (2-sided)	
Pearson Chi-Square		4.813a		6	.568	

4.1.4. Does Satisfaction Rate Vary by the level of Education?

According to the census of 2021, nationally literacy rate is 76.2 % out of which 83.6% were literate male and 69.4% literate female and in Gorkha district region wise literacy rate as stated in Table 6 (National Statistics Office, 2023).

There is no significant difference observed regarding the level of satisfaction across education groups from the socio-technical assistance received from Nepal government and other agencies because statistical p-value of Chi-square test is .607 which is greater than .05 significant level. This indicates that there were no differences between the literacy status of respondents regarding the service received during the reconstruction. We accept the Hypothesis no 1 - no difference by education groups from results in Table 6.

4.1.5. Does Satisfaction Rate Vary by Age groups?

The data presented in Table 7 shows that more people (100%) from 50-60 years were very satisfied than other age group from the socio-technical support of government and non-governmental organization during the reconstruction. Whereas 2.5% people from 71-80 age group were unsatisfied followed by 61-70 years (1.7%), and 81 and above years (1.2%). The future program should consider views of these people.

Table 6: Satisfaction Rate and Education

		Education					*Total*
		Illiterate	*Primary education*	*Secondary education*	*+2 intermediate*	*SLC pass*	
Satisfaction	Unsatisfied	2.9%					2.0%
	Satisfaction	53.3%	62.5%	83.3%	100.0%	53.8%	55.6%
	Very satisfied	43.8%	37.5%	16.7%		46.2%	42.4%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Chi-Square Tests							
			Value	Df		Asymp. Sig. (2-sided)	
Pearson Chi-Square			6.357[a]	8		.607	

There is no significant difference in the level of satisfaction across age groups from the socio-technical assistance received from Nepal government and other agencies because statistical p-value of Chi-square test is .415 which is greater than .05 significant level, which indicates that level of satisfaction of different age of people were almost similar. The decision from this test is to accept the Hypothesis no 1.

Table 7: Satisfaction Rate and Age group

		Age group				*Total*
		50-60 Years	*61-70 Years*	*71-80 Years*	*81 and above Years*	
Satisfaction	Unsatisfied		1.7%	2.5%	1.2%	2.0%
	Satisfied		61.0%	51.2%	61.7%	55.6%
	Very satisfied	100.0%	37.3%	46.3%	37.0%	42.4%
Total		100.0%	100.0%	100.0%	100.0%	100.0%
Chi-Square Tests						
			Value	Df	Asymp. Sig. (2-sided)	
Pearson Chi-Square			6.070[a]	6	.415	

4.2. Is the satisfaction rate same across vulnerable categories?

Vulnerable group in a population is at increased risk of poor health or exploitation due to several factors such as poverty, social exclusion of minority status in particular women, children, elderly and people with disabilities. However, due to the complex social structure it is difficult in defining vulnerable community in Nepal. So in broader concept, particularly marginalized-migrants, Informal workers, women, children, socially disadvantaged Dalit, Madhesi and janjati communities are among the most vulnerable (UNESCO, 2023).

Similarly, vulnerability is also understood as condition of people that makes them unable to cope or recover after a disaster. It depend on a set of complex factors such as physical capacities, caste, class, gender, social network, income, land and other assets, information, legal entitlements, government policies and mechanisms among others (UNDP, 2021).

Table 8: Satisfaction rate and vulnerable categories

		Vulnerable Categories			*Total*
		Single Women above 65 Years	*Senior Citizen above 70 Years*	*PWD*	
Satisfaction	Unsatisfied	3.3%	1.5%		2.0%
	Satisfied	52.7%	55.7%	68.4%	55.6%
	Very satisfied	44.0%	42.8%	31.6%	42.4%
Total		100.0%	100.0%	100.0%	100.0%
Chi-Square Tests					
		Value	Df	Asymp. Sig. (2-sided)	
Pearson Chi-Square		2.640[a]	4	.620	

Table 8 results illustrates that there is no significant difference in the level of satisfaction across people in vulnerable categories from the socio-technical assistance received from Nepal government and other agencies. The statistical p-value of Chi-square test is .620 which is greater than .05 significant level, which indicates that different vulnerable groups were equally satisfied from the service received from during reconstruction. The decision from this test is to accept the Hypothesis no 1 and Hypothesis no 2.

4.2.1. Testing of the Basic Needs Theory

As presented in Figure 1 in section 2.6, housing represents the highest-value possession held by an individual or a family representing both social and economic significance (Tafti & Tomlinson, 2015; Wijegunarathna et al., 2018). Satisfaction is an individual' varying perspectives of his or her own quality life based on their living style with varied degrees of acceptance and social recognition (Peng et al., 2018; Ao et al., 2022). Rather than only meeting the basic needs of housing, permanent housing requires to address other important needs as stated by (A.H.Maslow 1943) in terms of meeting basic needs. In our survey as depicted below in Table 9 ,shows safety needs were met over 85% and self-actualization as highest contributing factor over 95% need met. Furthermore, Bachelard and Jolas (1994:314) stated that shelter

is more than a house that is deeply rooted with cultural aspects to make it a home and is influenced by personal factors such as intimacy, daydreams, imagination and memories representing as a '*a large cradle*'; serving as an individual's primary world from the outset.

Likewise, residential satisfaction can be termed as the extent to which an individual's housing or residential environment meets their expectations or needs. And defined as *'feeling of contentment when one has or achieves what one needs or desires in a house*' (Mohit & Raja, 2014). Basic needs theory is found to be relevant based on the findings on statistical test for the post-disaster reconstruction. This data supports the theory as the findings suggest the basic needs factors are crucial in determining the satisfaction of the vulnerable earthquake beneficiaries.

Table 9: Basic Needs

			Vulnerable Categories			*Total*
			Single Women above 65 Years	*Senior Citizen above 70 Years*	*Poor, weak and disable PWD*	
	Basic Needs-Achieving Individual Potential	Count	86	187	19	292
		%	95.6%	96.4%	100.0%	
	Esteem Needs	Count	76	171	19	266
		%	84.4%	88.1%	100.0%	
	Q37_1_A_3 Social Needs	Count	77	181	19	277
		%	85.6%	93.3%	100.0%	
	Q37_1_A_2 Safety Needs	Count	79	182	19	280
		%	87.8%	93.8%	100.0%	
	Q37_1_A_1 Physiological Needs	Count	74	165	18	257
		%	82.2%	85.1%	94.7%	
	Q37_1_A_0 Livelihood	Count	65	156	16	237
		%	72.2%	80.4%	84.2%	
Total		Count	90	194	19	303
Percentages and totals are based on respondents.						
a. Dichotomy group tabulated at value 1.						

5. Discussion

Satisfaction from the reconstruction program refers to the level of contentment, fulfilment, or positive appraisal experienced by individuals or communities who have undergone the process of post-disaster reconstruction. It reflects their perception of the outcomes, benefits, and overall effectiveness of the reconstruction

efforts. Satisfaction can encompass various aspects, including the quality of the rebuilt structures, the level of support received, the extent to which needs and preferences were considered, and the overall impact on their lives and well-being.

There has been several studies such as from Ratnayake and Rameezdeen (2008), with regards to the post-disaster housing reconstruction to assess the comparative study of donor driven vs owner driven reconstruction approach in the context of Sri Lanka after the Indian Ocean Tsunami, that has evidenced that the "Owner Driven" approach is more advantageous as well as user ends more satisfied over donor driven approach (Ratnayake & Rameezdeen, 2008). Similarly, the findings suggest that the owner-driven housing programme is more successful than the donor driven programme in particular in terms of Quality /Durability, Space availability, flexibility to make future changes (Ratnayake & Rameezdeen, 2008).

Similarly, study by Ophiyandri et al. (2020) assessed community satisfaction levels of 20 respondents on the housing reconstruction project after Mentawai tsunami in 2010-a case study at Sipora Island result showed the level of community satisfaction was at 2.91 among the rate of the satisfaction levels until very satisfied with points values 1-5. Similarly, study of post-disaster satisfaction by (Ao et al., 2022) based on survey after ten years after the Wenchuan earthquake evidenced the satisfaction factors such as awareness of post-disaster reconstruction, more the annual income increment, and other six factors such as housing construction quality, public service, cultural policy for rural residents leading to the greater level of satisfaction.

Davidson et al. (2007) emphasized that community satisfaction plays a crucial role in post-disaster resettlements as it fosters the long-term engagement of communities in rebuilding their socio-economic lives. In Ophiyandri et al. (2010) community-based resettlement programs contribute to the creation of community satisfaction, which, in turn, fosters a sense of ownership. This sense of ownership is instrumental in building disaster-resilient communities. In conclusion, our study evidenced higher satisfaction level from ODR-STA programme even after eight years of reconstruction also supporting relevant literature in this area.

5.1. Limitations of the study

- The sample size considered in this study is based only one region of the highly affected earthquake districts and small sample size for the analysis.
- This current research is focused and constrained with a one district and few rural and urban municipality, although the samples was designed to represent the 'vulnerable earthquake beneficiaries.

– The variables collected were limited in number as well as the range of data scale values. The satisfaction of the respondents is based on their understanding of the questionnaire depending on their own level of education and mood at the time. Therefore, the questionnaire should also take objective phenomenon into account and the language should be clear and easy to understand to avoid redundancy in the future.
– Further studies can be collected from other regions for the generalizations. This sample sizes was only based on questionnaire survey so bigger sample sizes along with qualitative research method (Saunders & Lewis, 2018) will further enhance the findings by providing detailed account from the point of view of beneficiaries.

5.2. Contribution to the knowledge

This study contributes to the post-disaster literature by providing empirical evidence for analysis of the satisfaction of the vulnerable households based on their socio-economic characteristics and vulnerability factors. Several scholars have focused on the post-disaster recovery process (Ahmed, 2011), implementations (Barenstein, 2006) or overall review (Acharya et al., 2022) or just project-based approaches (Rawal et al., 2021), program based accountability and delivery (Ophiyandri et al., 2010) or technical aspects (Fallahi, 2007; Ganapati & Ganapati, 2008), or satisfaction level on the comparative study of Donor Driven Programs Vs Owner driven programme (Ratnayake & Rameezdeen, 2008) but they have not explored the 'vulnerable beneficiaries' and their satisfaction rates based on socio-economic indicators and vulnerability issues also noted by (Mumtaz et al., 2008; Lin et al., 2017).

While Karki et al. (2022) stated based on their study findings that the newly constructed houses were deemed unsuitable to fulfil daily needs and did not align with climatic and socio-cultural dimensions observing that vulnerable households, regardless of their socio-economic situation, faced delays in their housing reconstruction even with the provision of a blanket grant. Our study explored above issues further and established the satisfactions of the ODR-STA programme with carefully designed statistical tests. Further analyses of impact will be explored in next upcoming series of working papers with structural equation modelling.

Limited number of studies assessed the satisfaction rates from the one of the largest piloted ODR-STA programs from end users' perception of humanitarian

program interventions in the post-disaster reconstruction process from social dimensions perspectives. Therefore, this study contributes by offering an empirical perspective on how the vulnerable beneficiaries 'and their satisfaction level differs based on socio-economic indicators.

5.3. Conclusion and Recommendation

Conclusion

The main purpose of this research is to fill existing gaps in post-disaster knowledge of the relationship between satisfaction rates from reconstructed houses under the ODR-STA and socio-economic compositions in Nepal. Data obtained from the original survey was used to assess the satisfaction rates from the Socio-technical assistance (STA) module part of the post-earthquake earthquake housing reconstruction programme. The study results focused on whether the '*Satisfaction rates*' varied by socio-economic conditions and vulnerable categories of the earthquake beneficiaries from assistance in housing reconstruction interventions after 2015 earthquake.

The fulfilment of requirements of STA program module, tailored to support the vulnerable earthquake beneficiaries is validated from beneficiaries' perception as hypotheses-there is no significant differences in the satisfaction rates by the socio-economic indicators/demographic conditions such as age, gender, ethnicity, education, religion, and vulnerability characteristics. Respondents across these groups were found to be equally satisfied. Assistance thus was evidenced being provided without any discrimination based on humanitarian principle of humanity, neutrality, impartiality and independence (European Commission, 2023).

The recovery after the disaster entails of several layers but the important aspect is of rehabilitation and reconstruction, a critical stage and opportunity to "Build Back Better" to build resilient society (Lin et al., 2017). Research hypotheses H1 and H2 were accepted by the statistical tests and analyses. In theory the social vulnerability, and socio-economic condition/indicators should not influence the satisfaction rates causing different experience of recovery for the citizens and government. The survey response of 304 respondents showed the higher satisfaction irrespective or gender, age, ethnicity, religion, and education as well as no significant association even with vulnerable categories. Each survey respondent irrespective of gender, age, ethnicity, religion, and education or vulnerability category belonging to is equally

satisfied as any other from the STA program intervention. This statistical support to H1 and H2 means effectiveness of the grant, technical support, types of support programme in generate satisfactions and welfare to intended beneficiaries.

Recommendations for future researchers and stakeholders

- Consider greater sample size from the other earthquake affected 32 districts to explore the effectiveness and impact from the end users' perspectives.
- Researchers can study by covering the '*highly affected 14 districts*' and *'partially affected 17 districts*' to assess satisfaction level of earthquake beneficiaries.
- Researchers can assess the management and technical aspect of post-disaster ODR and STA impact.
- Future programs need to consider other socio-economic indicators in general. Currently the government identified vulnerable categories were based only on (age, gender and disability limited within red or blue card holders only).
- Revise and tailor the programs instead of implementing 'One Size fits all" approach to target the vulnerable beneficiaries by tailoring the one-to-one support program to minimise the aid being ineffective and to avoid failure of policies for long run disaster resiliency.

A Declaration of Interests: We hereby declare that the disclosed information is correct and that no other situation of real, potential, or apparent conflict of interest is known to me. We have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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