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Sociological Analysis of Construction Initiatives in Landless Communities: Practices of Gorkha Earthquake in Nepal

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Abstract

Earthquake disaster is burning issue of the world including Nepal. It has became crucial phenomenon of global society. In this context his research paper examines the sociological aspects of earthquake disaster-resilient housing construction initiatives in landless communities affected by the 2015 Gorkha earthquake in Nepal. It highlights the significant outputs and outcomes of local housing strategies that leverage indigenous materials, knowledge, and social support. Utilizing a descriptive research methodology, data was gathered through close-ended and open-ended questionnaires, case studies, and field observations across various impacted communities. Secondary data sources included existing literature on landless housing reconstruction and community-based initiatives. The findings reveal that the landless communities suffered greatly due to seismically vulnerable structures, lack of preparedness, and insufficient use of critical seismic features. These communities often lack access to vital information that could mitigate disaster risks. The study further explores how residents have innovatively rebuilt their homes by integrating safety measures, utilizing salvaged materials, and combining traditional knowledge with scientifically validated techniques. This approach not only addresses immediate housing needs but also fosters long-term resilience against future disasters.

Keywords: adaptive, climate-change, earthquake disaster-management, resilient, social-support

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Introduction

Social phenomena and social interaction lead to need and typology of shelters. Traditional home constructions are unique, and local construction technologies in local places are engrossed by the local people, resources, and expertise in the setting of landless populations. Vernacular housing constructions are widely spread worldwide. Their logical and resilient qualities are becoming more commonly acknowledged regarding long-term sustainability and resilience to changing climate and disasters. According to Gautam et al. (2016),

disasters and housing are inextricably linked, though this correlation is enhanced in developing nations where property is seen as one of the most valuable assets for the people. According to global paradigms in diverse calamities and climatic situations, vernacular homes performed responsibly regarding survival and minimal damage intensity throughout previous disasters.

Especially in the case of resourceless and landless house reconstruction, resourcing post-disaster housing reconstruction involves various challenges that hamper reconstruction efforts. It is crucial to comprehend these sensitive difficulties to decide on the best remedies to minimize their consequences. Living in open spaces, relocating temporarily, lacking direct access to one's property, and lacking immediate assistance owing to the lack of one's land and homes facilitating to sociological factors in study area. Building a new home seems to be considerably more difficult when compared to people who have their land and have destroyed previous stories. Chongbang & Bhardwaj, (2021) claim the accessibility, affordability, and entertainment of construction on new houses in landless communities are major hindering issues in reconstruction. Due to the accessibility of legal land, lower power access to political and administrative structure, lack of enough budget, and lack of enough technical skills, the landless communities have practised a weak and forced approach to typology construction at a local level. Which may directly connected with local sociological factors.

The sociological perspective can be emphasized through the social constructionist viewpoint, which posits that social problems are not inherent but are shaped by cultural, historical, and political contexts. By examining the philosophical foundations of this perspective, the text illustrates how societal narratives and power dynamics influence the perception of issues, thereby affecting policy formulation. This analysis is crucial for understanding housing and urban policy, as it reveals the ways in which constructed realities impact decision-making processes and outcomes. Furthermore, the future research should advocating for a deeper exploration of how social constructs can be critically assessed to inform more equitable and effective policy interventions (Jacobs et al., 2004).

According to Vasić et al. (2023), the study investigates the impact of the ongoing global crisis on socio-economic aspects related to building materials usage and procurement in Serbia. By addressing gaps in existing literature, the research enhances understanding of how the crisis has influenced wages, market prices, and material consumption within the construction sector. Data collected through a questionnaire were analyzed using statistical methods such as frequencies, descriptive statistics, and Spearman's correlations. Unlike previous studies focused on expert surveys, this research incorporates perspectives from the general public, examining socio-demographic factors alongside changes in material consumption pre- and post-crisis. It highlights a significant shift towards ecological awareness and the adoption of innovative materials, reflecting broader economic and environmental trends in a developing context.

The growing research on social support in the context of social stress and health would greatly benefit from a closer examination of social structure. It is important to clearly differentiate between three key aspects of social relationships often labeled as social support: (1) their existence or quantity (social integration), (2) their formal structure (social networks), and (3) their functional content (the specific meaning of social support). Additionally, understanding the causal relationships between the structural elements of social relationships and their functional aspects is crucial. There is a need for further research and theoretical development regarding the determinants of social integration, networks, and support, as well as their effects on stress and health, with particular emphasis on macrosocial structures and processes (House, 1987).

Socio-economic conditions play a crucial role in facilitating housing construction for landless households, particularly in the context of disaster recovery. In a study focusing on disaster management initiatives in earthquake-affected

communities in Nepal, it was found that local social support significantly enhances the resilience of disaster-affected households compared to external assistance. The research highlighted that support from local households, neighborhoods, and community organizations is more immediate and adaptable, suggesting that interventions should prioritize strengthening local capacities rather than relying heavily on external support (Chongbang, 2022; Adhikari et al., 2024a). This approach not only aids in quicker recovery but also empowers communities to address their own housing needs effectively in the aftermath of disasters.

In conclusion, socio-economic conditions significantly impact the construction of housing for landless households, particularly in the context of crises such as natural disasters. The ongoing global crisis has reshaped various socio-economic factors, influencing the procurement and usage of building materials, as noted in recent studies. These changes affect wages, market prices, and the availability of resources essential for construction. Moreover, local social support networks have proven to be vital in facilitating quicker recovery and resilience among affected households, as they often provide more immediate and adaptable assistance compared to external sources. Therefore, effective interventions should focus on enhancing local capacities and fostering community-driven approaches to housing construction, which can better address the needs of landless households in a sustainable manner.

Despite the insights gained from current research on socio-economic conditions and housing construction, several gaps remain that warrant further exploration. Firstly, while the social constructionist perspective emphasizes the influence of cultural and political contexts on societal issues, there is limited empirical research that directly links these constructs to specific housing policies and outcomes. Future studies should focus on how different societal narratives shape the experiences of landless households and influence policy decisions. Additionally, while recent work has highlighted the importance of local social support in disaster recovery, there is a need for more nuanced investigations into how various socio-demographic factors intersect with these supports to affect housing stability and recovery processes. Moreover, the shift towards ecological awareness in material usage raises questions about how sustainability practices can be integrated into policy frameworks effectively.

Addressing these gaps will contribute to a more comprehensive understanding of the socio-economic factors affecting housing and enable the development of more equitable and impactful policy interventions. To advance research on the socio-economic factors influencing housing construction for landless households, several avenues should be pursued. Firstly, future studies should incorporate a mixed-methods approach that combines quantitative data on socio-economic conditions with qualitative insights from affected communities. This would allow for a deeper understanding of how cultural, historical, and political contexts shape local narratives around housing issues. Additionally, research should focus on the effectiveness of various policy interventions, particularly those that emphasize community-driven approaches and local social support systems, in enhancing resilience and recovery in disaster-affected areas. Exploring the intersection of ecological awareness and building practices can also yield valuable insights, particularly in light of the ongoing global crisis and its impact on material consumption and sustainability in construction. By critically assessing these social constructs and their implications for policy formulation, researchers can contribute to the development of more equitable and effective interventions that empower communities to address their housing needs sustainably.

Literature Review

Sandle (2017) briefly discussed the contribution of Karl Marx and Friedrich Engels to the historical understanding of socialism. The Communist Manifesto's publication in 1848 marked the beginning of the contemporary socialist movement. The term communism, which received widespread usage at this time and was usually used in conjunction with the idea of socialism, was frequently used, even though the former used to have a more aggressive meaning. It is likely the

rationale behind the Communist League's usage of the document, the group that engaged Marx and Engels to write the Communist Manifesto. Engels later explained that the term "communism" meant a common ownership structure. But more crucially, because it was more easily associated with the concept of the class struggle and the materialistic view of history, it contributed to distinguishing Marx and Engels' ideas from those of the so-called utopian socialists. The Communist Manifesto was written concurrently with the revolutionary wave that swept through Europe between 1848 and 1849, according to Sandle. Marx and Engels were still changing the proofs of their upcoming renowned pamphlet as the first barriers of 1848 were being constructed in Paris. The Manifesto was published after a period of political instability, it is true, but the revolutionaries of the time did not respond to it particularly. Nevertheless, because it described the logical j as the revolution gets underway, forming new forces of production. Finally, social protection or collectivism can help impoverished, excluded, disadvantaged, and landless households experience social justice. During this reconstruction, the market economy has dominated Powerless and resource less people and is victimized by a dominant external technology-based intervention. Landlessness is the extreme outcome of "capitalism" and its painful practical implications, which are based on "scientific socialism." The misery of landless households from the social protection in the "capitalism" structure can be reduced by scientific socialism advocacy on social support, collectivism, and joint venture for socially disadvantaged and marginalized ones. Still, we cannot transmit the entire structure of society as a miracle. By boosting socioeconomic prospects for landless households and enabling local opportunities by increasing the use of local and sustainable resources, we may create a rebuilding framework that is more scientific and useful.

Understanding how well homes operate following the 2015 Gorkha earthquake is essential for ensuring resilient and sustainable lives in any geographic and climatic location. After the Gorkha earthquake, traditional housing renovation and strengthening and the idea of rural and sub-urban reconstruction have become more significant in Nepal. To protect the lives and property of locals in rural Nepal, local strengthening solutions such as buttresses, corner posts, corner ties, and wall bracings may be an effective solution for weakly damaged homes. It is essential to identify the resilient aspects of vernacular constructions in terms of construction technology and their performance model during prior events before the formation of such frameworks. Strengthening local housing construction reviving traditional home construction skills, and it has greatly benefited resourceless as like landless. According to Gautam et al. (2016) Nepal is not doing great research and promoting native housing construction due to the rising interest and activities in RCC constructions. The locally relevant technologies and local resources are being backward. Several essential components of vernacular structures have lost favour in recent years.

Despite the considerable damage, the most popular construction in Nepal is stone mud mortar (SMM) masonry from the ancient, which has continued in post-earthquake rehabilitation. The SMM typology continues to be the most frequently used in the reconstruction effort, despite being the biggest contributor to damage. The difficulties in offering imported construction materials like steel, cement, or bricks to remote areas or the difficulty of transportation can be summarized as the main reasons why many households choose the SMM type. Adhikari and D'Ayala (2020) explain how the most prevalent conventionally built SMM construction, which lacked sufficient seismic-resistant characteristics, had poor seismic performance, which is the leading cause of the extensive damage incurred by residential buildings in the 2015 Nepal earthquake sequence. Although Nepal's residential construction practices and level of seismic design have significantly improved since the 2015 Gorkha earthquake, and the nation is working to increase the seismic resilience of communities in the post-earthquake reconstruction, there are still several pressing issues, such as small-sized houses that negatively affect communities'

ability to support themselves, an inadequate inspection of workmanship flaws, and a lack of code compliance in the reconstruction. Schiavi et al. (2019) claim a potential building technique nowadays is stone masonry, which may be used to construct new structures as well as renovate older ones, restore the historical character of odd urban landscapes, protect cultural heritages, historic villages, small towns, and even everyday homes. Additionally, it is a sustainable rehabilitation technique that complies with the reduced cost of construction and demolition waste to rebuild stone masonry structures using recycled, well-quality stone material, particularly in earthquake-devastated areas. On the other hand, as it restores local economies and craft activities, the reconstruction of stone masonry buildings—even improved with acceptable, new technological supports, components, and materials—is an interesting resource from an economic and societal point of view.

In Nepal, owner-builder techniques have been used haphazardly to construct primarily residential buildings without consulting architects or engineers or considering earthquake safety precautions. People haven't yet realized how critical earthquake-resistant buildings are, despite the incident of previous large earthquakes and their negative repercussions. The leading cause of this can be ignorance and false perceptions of individuals. People think that creating structures that can withstand earthquakes is considerably more expensive than building those that can't.

Further, he claims that building a load-bearing structure costs very inexpensively. Most research focuses on reinforced cement concrete (RCC) frame structures rather than load-bearing structures. Due to the increased need for research on load-bearing structures today and the impact of the 2015 earthquake on isolated rural areas, the government of Nepal plans to develop many load-bearing structures in the village. Therefore, a study or research is required by today's society to determine the true cost difference between earthquake-resistant residential buildings and those that are not.

One of the first "structural materials" used by humans was stone masonry. Stones, mortar, and frequently filler material between leaves are layered to create it. The components have extensive connections and interactions, primarily unknown designs, and various mechanical properties. Because of these features, stone masonry is a highly diverse material for which it is challenging to describe realistic behavioural rules. This problem still requires more study through laboratory, empirical ground, or onsite experimental campaigns. In actuality, the geometry and geometrical distribution of the stones along the façade and cross-section of the element, and therefore, on the layout of the interfaces, i.e. the joints, may substantially influence the mechanical properties of a stone masonry element. Quelhas (2014) claim it could be challenging to characterize existing stone masonry constructions. Specific multidisciplinary approaches to evaluation are required to offer the essential data for understanding the processes that contributed to the current state of the construction and to choose the most suitable intervention measures. The applicability, benefits, and drawbacks of some intervention techniques that have gained widespread use recently are discussed in this context. These techniques include grout injection, deep re-pointing of mortar joints, and application of transversal ties, which can be used singly or in combination on scaling up reinforce capacity in stone mud motor.

Chhaba & Singh (2017) claim that the advantages of mud bricks are their inexpensive cost and excellent thermal performance. Engineers and builders are unaware of the mechanics of mud bricks, even though they are among the oldest construction materials. Before building, there is a precise code design to follow. This research aims to increase the low thermal conductivity of clay bricks without compromising their low resistance to compression. The employment of various additives in this research's experimental programme aims to improve the compressive strength of the initial sludge mixture. According to the empirical findings, increasing the proportion of cement as a constituent results in a strong brick compression that is optimal within predetermined bounds.

Most previous studies contributed to a scientific theory or lab-based testing (control research). Still, we could not find a significant bonding between community-based empirical knowledge with scientific knowledge building, and the community has been suffering from local issues but has not yet been addressed by the scientific practitioner on the community problem of house construction, especially the poor-vulnerable and socially excluded household-centred. This study might dig out the primary empirical practices based on scientific theory and contribute to the collective knowledge building from community Vs scientific practices on highly disaster resilient and climate adaptive house construction.

Despite the existing empirical evidence surrounding the sociological analysis of construction initiatives in landless communities following the Gorkha earthquake in Nepal, significant gaps remain that hinder a comprehensive understanding of the situation. Specifically, while there is substantial data on general reconstruction practices, a nuanced exploration of local socioeconomic factors influencing the housing reconstruction process for landless communities has not been thoroughly addressed. This study aims to bridge this gap by examining the unique challenges and resources that landless individuals face in the reconstruction process, ultimately seeking to answer critical research questions related to these socioeconomic factors. By conducting a targeted survey, this research will illuminate the intricacies of how local conditions and community dynamics shape the rebuilding efforts in the aftermath of the disaster. Construction Initiatives Post-Earthquake

In the aftermath of the earthquake, various construction initiatives were implemented to rebuild homes and communities. These efforts focused on creating earthquake-resistant structures using locally available materials. Mishra (2018) notes that the development of building codes and guidelines was crucial for ensuring safety in reconstruction efforts. The National Reconstruction Authority (NRA) released manuals that emphasized the use of traditional materials and techniques adapted for seismic resilience, which were particularly relevant for landless communities lacking access to modern construction resources

Sustainable Practices

Sustainability emerged as a key theme in post-earthquake reconstruction. Mishra (2019a) discusses how cost-effective building practices were essential for landless communities, who often lacked financial resources. The incorporation of local materials such as stone and mud not only reduced costs but also aligned with traditional building methods that had historically provided some level of resilience against earthquakes

Additionally, Mishra & Acharya (2018) highlight the importance of community involvement in these initiatives. Engaging local populations in the construction process not only empowered them but also ensured that the solutions were culturally appropriate and contextually relevant. This participatory approach fostered a sense of ownership among community members, crucial for long-term sustainability

Challenges Faced by Landless Communities

Despite these initiatives, landless communities encountered significant challenges. The lack of secure land tenure complicated reconstruction efforts, as many families were hesitant to invest in permanent structures without guaranteed rights to the land they occupied. Mishra (2019b) emphasizes that addressing land tenure issues is vital for ensuring that reconstruction efforts are not only physically sound but also socially equitable

Moreover, the socio-economic status of these communities often limited their access to resources necessary for effective reconstruction. Many families relied on informal labor or subsistence agriculture, which left them vulnerable to economic shocks. The disparity in access to financial support and technical expertise further exacerbated their challenges during the reconstruction phase.

Resilience Through Community Networks

In response to these challenges, community networks played a pivotal role in facilitating recovery. Shrestha et al. (2017) indicate that social capital—defined as the networks of relationships

among people—was instrumental in mobilizing resources and support within affected communities

These networks enabled families to share knowledge about construction techniques and collectively address common challenges. Furthermore, traditional knowledge regarding earthquake-resistant construction practices became invaluable during this period. Mishra and Thing (2019) document how indigenous construction techniques—such as flexible jointing and thick masonry walls—were adapted to modern standards while retaining their cultural significance.

This blending of traditional wisdom with contemporary practices not only reinforced community identity but also enhanced resilience against future seismic events.

Objective & Research Methodology

The objective of this research is to identify and analyze the local socioeconomic factors that influence the reconstruction of houses in landless communities impacted by the Gorkha Earthquake in Nepal. This study aims to uncover the intricate interplay between social structures, community dynamics, and the availability of resources that shape construction initiatives in these marginalized groups. By focusing on the lived experiences of community members, the research seeks to understand the barriers and opportunities that affect their capacity to rebuild and recover from the disaster. This approach will highlight how factors such as local power dynamics, historical land ownership, and community relationships contribute to the overall reconstruction efforts.

The methodology of this study is based on a strong theoretical framework that includes ontology, epistemology, values, and logic in the sociological analysis of reconstruction practices. By adopting an ontological perspective, the research will investigate social structures and relationships among community members and households, focusing on how these dynamics affect collective agency and resource allocation. An epistemological approach will aid in knowledge acquisition through methods such as interviews, case studies, content analysis, and participatory observation, all within a qualitative research design (Adhikari, 2020; Adhikari et al., 2024b; Adhikari et al., 2024c; Adhikari et al., 2024d).

Ethical considerations will shape the research process, focusing on social justice and empowering marginalized voices. The study will utilize a combination of qualitative and quantitative data collection methods. This will culminate in a thematic analysis to identify key patterns that can inform future interventions aimed at enhancing the resilience of landless communities.

This study applied the mixed-method approach, combining qualitative and quantitative techniques to provide a comprehensive analysis of construction practices in landless communities following the Gorkha Earthquake in Nepal. Field visits were conducted across various local government areas in the Gorkha district, where anecdotal evidence regarding Stone Mud Motor (SMM), Brick Masonary Cement (BMC), and Reinforced Cement Concrete (RCC) was collected. This qualitative data was complemented by a subsequent desk study to analyze technical aspects such as material composition, inbuild local technology, adaptability to local weather, and sustainability (Yin, 2003). This dual approach ensured a robust understanding of both the practical and theoretical frameworks surrounding construction in these communities.

The qualitative component of the research demands the case study and content analysis as the method (Adhikari et al., 2024e; Adhikari et al., 2024f; Adhikari et al., 2024g; Adhikari, 2024). This enables a thorough examination of three significant case studies, each representing a different construction type: SMM, BMC, and RCC. Structured interviews were conducted with homeowners, masons, and neighbors to gather insights into the houses' resilient characteristics and understand the construction framework and risk resilience of these homes. Additionally, informal conversations with local leaders and community members provided valuable insights into the lived experiences of the inhabitants. This approach

emphasizes that qualitative research can effectively illuminate the complexities of social phenomena. (Creswell, 2007).

For quantitative analysis, descriptive research methodologies were utilized, allowing for the systematic organization and interpretation of numerical data related to housing construction. A sample of 100 representatives from landless households were engaged to gather insights on construction practices and technologies used in earthquake-resistant housing. The data collected not only shed light on the physical attributes of the homes but also revealed the socio-economic factors influencing construction decisions. This combination of qualitative and quantitative methods enhances the study's validity and reliability (Mason, 2002).

The theoretical framework guiding this research encompassed ontology, epistemology, and values. Ontologically, the study recognized the social structures and dynamics influencing construction practices in landless communities, focusing on their interactions with available resources. Epistemologically, it examined how knowledge is acquired and interpreted through empirical observations and community engagement. Finally, the research reflected on the ethical implications and values inherent in studying marginalized communities, ensuring that the findings contribute positively to social justice and equity (Stake, 2010). By employing this rigorous methodology, the study aims to provide valuable insights into disaster-resilient construction practices that could inform future community-based initiatives.

Theoritical Orientation

Ecological theory, developed by Urie Bronfenbrenner, offers a comprehensive lens through which to examine the complex interactions between individuals and their environments. Central to this theory is the concept of multiple systems, including the microsystem, mesosystem, exosystem, and macrosystem, each playing a crucial role in shaping human development (Bronfenbrenner, 1994). The microsystem encompasses the immediate environments—such as family, school, and peer groups—where direct interactions occur and have a significant influence on an individual's development. The mesosystem reflects the interconnections between these microsystems, highlighting how relationships between family and school can impact a child's growth (Bronfenbrenner, 1994).

The exosystem expands on this by including settings that indirectly influence the individual, such as a parent's workplace or community resources. These external factors can affect the microsystems and subsequently alter an individual's developmental trajectory

In the context of housing construction in rural settings, ecological theory provides a valuable framework for analyzing the interactions between human settlements and the natural environment. While it helps understand the ecological impacts of housing development, several empirical gaps remain that warrant further investigation. For instance, research on the long-term ecological consequences of housing construction—such as changes in biodiversity and soil quality—could provide critical insights into sustainable practices (Smith, 2020). Additionally, exploring the ecological impact of various building materials through life cycle assessments could inform better choices in rural housing construction (Johnson & Lee, 2021).

Further empirical research could also address energy efficiency and the use of renewable energy technologies in rural housing. Studies assessing energy consumption patterns and carbon emissions can offer practical guidelines for enhancing sustainability in these projects. Social and cultural dimensions should not be overlooked, as understanding how housing design affects community dynamics and residents' well-being can lead to more culturally sensitive developments (Miller, 2023). Lastly, investigating the effectiveness of policies and governance mechanisms in promoting sustainable housing practices can yield valuable insights into regulatory impacts and community engagement (Davis, 2024). Addressing these gaps will enhance our understanding of the

ecological theory's application in rural housing contexts and support the development of more sustainable, ecologically sensitive practices.

Ecological theory, as articulated by Urie Bronfenbrenner, offers valuable insights into the socio-economic analysis of landless household reconstruction capacity by framing the challenges faced by these households within interconnected systems. The microsystem, which encompasses immediate family and community interactions, reveals how social support and resource access are crucial for reconstruction efforts (Bronfenbrenner, 1994). In this context, community networks can either facilitate or impede recovery, emphasizing the importance of collaborative initiatives and local governance in aiding landless households. The mesosystem's focus on the relationships between different environments further highlights how local policies and educational opportunities can shape the capacity for economic mobility and resilience (Bronfenbrenner, 1994). Furthermore, the exosystem brings attention to external influences, such as employment opportunities and access to financial resources, that indirectly affect these households' ability to rebuild . Finally, the macrosystem underscores the impact of broader socio-economic policies and cultural attitudes, illustrating how systemic inequalities can exacerbate the challenges faced by landless families (Bronfenbrenner, 1994). By utilizing this holistic framework, researchers and policymakers can better understand and address the multi-layered socio-economic factors influencing the reconstruction capacity of landless households, ultimately fostering more effective and sustainable recovery strategies.

Results and Discussion

Table 1

Safety Features

Safety Features	Percentage
BMC	15.22%
CSEB	6.52%
HCB	21.74%
RCC	43.48
SMC	9.78
SMM	3.26

The data was collected from local respondents from landless communities in Gorkha Nepal. Among the participants, 13% respondents were from Arughat, 20% were from Deurali, 33% were from the Gorkha municipality area, 17% were from Palungtar, 9% were from Sahidlakhan, and 8% participated from the Siranchowk area. Among this construction, 14% of respondents were from BMC, 3% from CSEB, 20% from HCB, 4% from RCC, 1% from SMC, and 58% were SMM.

Table 2

Cost of Housing

Cost of Housing	Percentage
High	59%
Modorate	35%
Low	6%

Table 3

Thermal Comfort

Thermal Comfort	Percentage
High	83%
Modorate	10%
Low	7%

While our team asked about major considering factors during site selection, 36% of respondents said they considered risk-free areas, especially landslides, 8% said their site is far from the river basin, 37% considered terrain conditions, and 19% considered ground typology. While considering reinforcement in reconstruction, 39% of respondents said they considered only Vertical reinforcement and Horizontal band, but 61% of respondents said they considered Vertical reinforcement, Horizontal band, Cornerstone, through stone, and Percent of opening in a wall while they constructed their new story. 58% of respondents said they completed their house construction below 5000$ (1$=100NRs) without the cost of salvage material, and all were constructed stone masonry with mud (SMM) typology.

36% of respondents said their house cost is between 5000$ and to 7000$ and the typology is mixed (BMC- Brick masonry with cement motor, CSEB-Compressed stabilized earth brick, HCB-Hollow concrete block, SMM-stone masonry with mud, and SMC- stone masonry with cement), and 4% of respondents said they constructed their house above of 10000$ in RCC typology.

Table 4

Hotness

Hotness	Percentage
High	7%
Modorate	90%
Low	3%

Sixty per cent (60%) of respondents said their new house is naturally warmer than external weather during winter and cooler in summer, who have constructed on their SMM typology. 65% of respondents said they could store the seasonal cereal food in their house without damage in a new house from two to six months, and all are constructed on SMM typology. They added their further empirics on; due to the thermal capacity of stone and mud in the local context, the natural storage capacity of SMM typology is prolonged. 12% of RCC house owners also said the same of SMM housing typology, 44% of respondents said they could store the seasonal cereal food for only below two months, and most of they were constructed their houses from (BMC- Brick masonry with cement motor, CSEB-Compressed stabilized earth brick, HCB- Hollow concrete block, and SMC- stone masonry with cement).

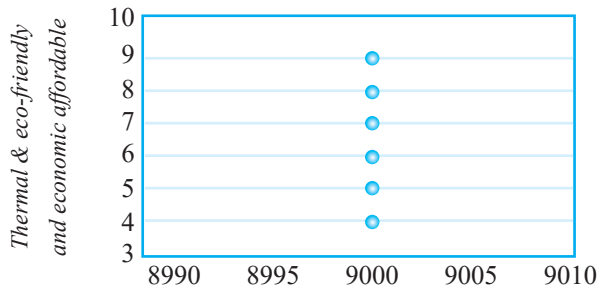
7% of respondents said they imported CGI sheets and Iron, and 93% said they imported CGI sheets, Reinforcement, Cement, Blocks (CSEB or HCB), and Iron. 61% of respondents said they used local mason and their higher engagement in SMM and SMC, and 87% of house owners said they were engaged in their house construction with the support of a local mason.

Comprehensive and comparative theorizing on stone machinery housing construction involves using stone as the primary material for constructing buildings. Stone has been used in construction for centuries and offers durability, aesthetic appeal, and natural insulation properties. However, it

may require skilled labour and can be more time-consuming and expensive compared to other methods. Break machinery, on the other hand, refers to the use of materials like bricks or concrete blocks for construction. This method is widely used due to its cost-effectiveness, ease of construction, and availability of materials. It allows for faster construction and can be suitable for various types of buildings. Cement machinery involves the use of concrete as the primary construction material. Concrete offers strength, versatility, and durability. It can be moulded into different shapes and sizes, making it suitable for a wide range of construction projects. However, it may require specialized equipment and skilled labour for proper mixing and pouring.

Figure 1

Simple Linear Regression



Where,

y=α+βx

Degrees of Freedom: df = n−2 = 98

Estimate of Slope:b= NaN

Standard Error Slope: SEb = NaN

Regression Standard Error: s= NaN

T -Statistic: t = NaN

95% Confidence Interval for β: NaN, NaN)

P -value: p = 0

Interpretation:

Assuming that the true slope is β = 0, the probability of seeing a test statistic as far out as t =NaN is 0.

That is, assuming that there is no straight-line relationship between Affordable and climate resilient status of Household and Thermals & eco-friendly, and Economic affordable , 0% of all similarly collected samples would have a test statistic as far away from 0 as t = NaN.

Conclusion: Reject the null hypothesis. (0=p<α=0.05)

This study investigates the socio-economic factors influencing the reconstruction of landless households in Gorkha, Nepal, to inform effective policy-making and resource allocation. Utilizing quantitative data gathered from local respondents, the research identifies key elements affecting reconstruction outcomes. Key findings reveal that 36% of participants prioritize geographical safety, especially in landslide-prone areas, while 37% focus on terrain conditions, indicating a critical relationship between site selection and risk management. The majority (58%) of households completed their constructions for under $5,000, predominantly using stone masonry with mud (SMM) typology, highlighting affordability as a crucial determinant. Additionally, 60% of respondents noted that their homes are naturally thermally efficient, emphasizing the importance of culturally appropriate construction methods. The study also underscores the socio-economic benefits of employing local masons, with 61% of respondents opting for local labor, which enhances community engagement and aligns construction practices with local resources. By quantifying these

socio-economic factors, this research provides valuable insights that can guide targeted strategies to support landless communities, fostering resilience and sustainable development in rural settings.

A case study on SSM of earthquake affected

When he lost his home to the 2015 earthquake, a man 36-14-7-0-93 of Gorkha couldn't see how he would ever be able to move on with his life. With a family of 3 to support, 59-year-old Ram says he had felt increasingly desolate about their recovery prospects. He is a resident of Siranchowk Ward 4 -Gorkha district, a landless beneficiary who has built a house on public land and never thought he would have built a house on his land. Though the government of Nepal introduced the policy of buying land for the landless people, with the support from the ward representative, he got hope of building his own house. Ward's representative supported him in purchasing land through NRA guidelines. The local Government representative had provided all administrative facilitation for Ram Bahadur Bishowkarma for agreement at the ward office and for buying the land to construct the house. He decided to go with SMM house, which is locally available and the local workforce can build along with applying earthquake features (like, horizontal bands, Vertical reinforcement, through stone and cornerstone, where the community agreed to provide him with their salvage material (Stone, wood) along with that local level decided to provide his timber from the community forest. The extended support from external actors motivated him to construct the house, and he withdrew the 1st tranche and initiated the construction. "I used my skills and began working on the wood while simultaneously supervising the few available masons helping me," Biswakarma says. Though he has invested a sum of around Rs 50 thousand in his new house, he says the costs would have been far higher if he had not managed to retrieve and reuse the old stones and wood from the wreckage. For instance, the new structure's foundation has been made entirely of stones from the old house. "I'm guessing it would've cost an extra Rs. 20 thousand overalls if I had to purchase all new construction material," he says.

Results and Discussion

Krishankumar et al. (2022) discuss that model SMM construction is based on local engineering materials locally. Mishara further claims on the SMM Model, which is highly considered for detailed cost estimation due to the high acceptance of most people in Nepal. He has further discussed the cost of the difference between conventional buildings and earthquake-resistant buildings, assuming wood available at least cost was near about 16.46% of the total cost of the building.

Stone mud machinery housing can indeed offer several advantages in terms of thermal friendliness, cost-effectiveness, and the utilization of local materials. Stone has natural insulation properties, which can help regulate indoor temperatures. Stone mud machinery housing can provide better thermal insulation compared to other construction methods, reducing the need for excessive heating or cooling. This can lead to energy savings and a more comfortable living environment. Stone is a widely available material in study areas, making it a cost-effective option for construction. Stone mud machinery housing can be built using locally sourced stones, reducing transportation costs. Additionally, the use of mud as a binding agent can further lower construction expenses, as mud is often readily available on-site or in nearby areas. Through stone mud machinery housing promotes the use of local materials, which can have several benefits. Firstly, it reduces the environmental impact associated with transporting construction materials over long distances. Secondly, it supports the local economy by utilizing materials that are abundant in the region. Lastly, it helps preserve the architectural heritage and cultural identity of the area by incorporating locally available stones into the construction. It is important to note that the success of stone mud machinery housing depends on proper design, construction techniques, and maintenance. Consulting with experienced architects, engineers, or construction professionals who specialize in this method can ensure the best results in terms of thermal efficiency, cost-effectiveness, and utilization of local materials.

Bhochhibhoya et al. (2016) examine the potential for global warming of the materials used to build the walls of three different building types—traditional, semi-modern, and modern. They contrast the three different building types' construction and association with greenhouse gas emissions. They assert that, based on the manufacturing and transformation of building materials, the overall global warming potential of a traditional building will be 20% lower than that of a modern building in 25 years. The production and transportation-related emissions might be significantly decreased if local materials, like wood, stone, and mud, are used in building construction.

Ecological theory in the context of housing construction in rural settings focuses on the relationship between human settlements and the natural environment. It emphasizes sustainable practices, resource conservation, and harmonious coexistence with nature. When considering theoretical and empirical bridging points between ecological theory and housing construction in rural settings, several key aspects can be explored: Ecological theory promotes the use of sustainable design principles in housing construction. This includes incorporating renewable energy sources, optimizing energy efficiency, utilizing locally sourced materials, and implementing passive design strategies to minimize environmental impact. This theory emphasizes the importance of selecting appropriate sites for housing construction in rural areas. This involves considering factors such as land suitability, ecological sensitivity, and preserving natural habitats. Empirical studies can provide insights into the impact of housing construction on local ecosystems and inform decision-making processes. Ecological theory encourages the implementation of efficient water management systems and sustainable waste management practices in rural housing construction. This includes rainwater harvesting, wastewater treatment, and recycling systems. Empirical research can provide data on the effectiveness of different approaches and their impact on the local environment. This theory emphasizes the involvement of local communities in the planning and design of housing projects. Empirical studies can explore the social dynamics and community engagement processes in rural housing construction, highlighting the importance of participatory approaches and the benefits they bring to both the environment and the community. Empirical research plays a crucial role in assessing the long-term ecological impact of housing construction in rural settings. By monitoring factors such as energy consumption, carbon emissions, biodiversity, and ecosystem health, researchers can evaluate the effectiveness of ecological design principles and identify areas for improvement. By bridging theoretical concepts from ecological theory with empirical research in rural housing construction, it is possible to develop evidence-based practices that promote sustainable development, minimize environmental degradation, and enhance the well-being of rural communities in further studies.

In the context of house reconstruction, Marxism would likely advocate for a comprehensive approach that addresses the underlying socioeconomic inequalities and class disparities. It would emphasize the need for equitable distribution of resources, ensuring that landless people have access to adequate housing and are not further marginalized in the reconstruction process. Socialism, on the other hand, would prioritize collective action and community involvement in the reconstruction efforts. It would emphasize the importance of public ownership and democratic decision-making, ensuring that the needs and voices of landless people are taken into account.

When examining the theoretical testing gaps in these perspectives, one potential gap could be the lack of emphasis on individual property rights and incentives for private investment. While Marxism and socialism focus on collective solutions, it is important to consider the role of individual ownership and entrepreneurship in the reconstruction process. A way forward could involve a synthesis of these perspectives, taking into account the strengths of both Marxism and socialism while addressing their theoretical gaps. This could include implementing policies that promote equitable distribution of resources, ensuring community participation and decision-making, while also recognizing the importance

of individual property rights and incentives for private investment to the landless households and communities. The reconstruction initiatives following the Gorkha earthquake illustrate a complex interplay between sociological factors and construction practices in landless communities. While significant strides have been made towards sustainable and resilient building practices, ongoing challenges related to land tenure and socio-economic disparities remain critical issues to address. Future efforts must prioritize inclusive policies that empower marginalized populations while fostering community resilience through participatory approaches and the integration of traditional knowledge. By understanding these dynamics, stakeholders can better design interventions that not only rebuild structures but also restore hope and agency within vulnerable communities in Nepal.

Conclusion

This sociological analysis of construction initiatives in landless communities following the Gorkha earthquake underscores the critical interplay of socio-economic factors, as framed by Bronfenbrenner's ecological theory. By examining the microsystem, mesosystem, exosystem, and macrosystem, the research reveals how individual experiences of reconstruction are deeply influenced by immediate community interactions, local policies, and broader societal contexts. The findings indicate that geographical safety and affordability significantly dictate reconstruction decisions, while the utilization of locally sourced materials and labor fosters community engagement and enhances economic stability. These insights highlight the importance of a multi-layered approach (as subjectivist view) to understanding housing reconstruction, emphasizing the need for targeted policies that address the specific circumstances and capacities of landless households.

The sociological analysis of construction initiatives in landless communities after the Gorkha earthquake supports and enhances Urie Bronfenbrenner's ecological theory by highlighting the interconnectedness of various environmental systems that shape individual experiences. The study reveals how community interactions (microsystem), local policies (mesosystem), and external factors like regional economic conditions (exosystem) collectively influence reconstruction efforts. It also emphasizes the role of societal values and norms (macrosystem) in shaping housing decisions, particularly regarding affordability and safety. Overall, the findings advocate for targeted, context-specific policies that recognize the complex dynamics affecting landless households, underscoring the need for a comprehensive approach in post-disaster housing reconstruction.

Moreover, the model case studies and number of respondents illustrates the potential for community support and local governance to facilitate recovery efforts. By leveraging local resources and engaging in collaborative practices, landless households can overcome significant barriers to rebuilding. This study advocates for a synthesis of ecological theory and practical insights, calling for policies that not only provide financial assistance but also empower communities through participatory planning and resource management. Ultimately, addressing the complex socio-economic dynamics within landless communities can lead to more resilient and sustainable housing solutions, fostering long-term recovery and growth in the aftermath of disasters like the Gorkha earthquake.

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Implications

This research will support formulating and applying the earthquake resiliency policy in the reconstruction sector in rural areas of the hillside.

References

Adhikari, R. K., & D'Ayala, D. (2020). 2015 Nepal earthquake: seismic performance and post-earthquake reconstruction of stone in mud mortar masonry buildings. *Bulletin of earthquake engineering, 18*(8), 3863–3896. https://doi.org/10.1007/s10518-020-00834-y

Adhikari, S. R. (2020) Gender issues in vedic social structure: *Tribhuvan University Journal, 35*(1), 193–208, https://doi.org/10.3126/tuj.v35i1.35881

Adhikari, S. R. (2024). Sociological understanding of social structure and kin based human behavior. *GS WOW: Wisdom of Worthy Journal, 2*(1),53–61. https://doi.org/105281/zenodo.12605286

Adhikari, S. R., Adhikari, B. S., Acharya, G., & Wasino, W. (2024d). Gender analysis through theoretical perspectives in sociology. *Asian Interdisciplinary and Sustainability Review, 13*(2), 51–61. https://doi.org/10.14456/aisr.2024.13

Adhikari, S. R., Chongbang, N., & Bhandari, M. (2024a). Sociological analysis of local support practices contributes into strengthening entrepreneurs' capacity. *Intellectual Journal of Academic Research, (IJAR), 2*(1), 73–84. https://doi.org/10.5281/zenodo.13501003

Adhikari, S. R, Shrestha, I., Adhikari, B. S. & Mishra, A. K. (2024b). Social challenges of women workers in the hotel industry. *International Journal of Interdisciplinary Research in Arts and Humanities, 9*(2), 48–54. https://doi.org/10.5281/zenodo.12760577

Adhikari, S., Adhikari, B., Acharya, G., & Wasino, W. (2024c). Marginalization of men in the patriarchal social structure of the Mahabharata Period. *Asian Crime and Society Review, 11*(2), 55–65. https://doi.org/10.14456/acsr.2024.12

Adhikari, S. R., Adhikari, B.S. & Acharya G. (2024g) E-learning method and university life of married female students in patriarchal social structure in sociological perspective. *Forum Ilmu Sosial, 51*(1), 66–84. https://doi.org/10.15294/fis.v51i1.5218

Adhikari, S.R., Adhikari, B.S., Acharya, G. (2024f). Gender Inequality in Historical Context of the Mahabharata Period: Analysis brough the Sociological Vantage Point. *Paramita: Historical Studies Journal, 34*(2), 333–343. https://doi.org/10.15294/paramita.v34i2.50309

Adhikari, S.R., Adhikari, B.S., Acharya, G. Dahal, S., Adhikari, B., Sharma, T. (2024e). Glimpse of ancient social history through the social structure of the Mahabharata period. *Paramita: Historical Studies Journal, 34*(1), 43–54. https://doi.org/10.15294/paramita.v34i1.47901

Bhochhibhoya, S., Zanetti, M., Pierobon, F., Gatto, P., Maskey, R. K., & Cavalli, R. (2017). The global warming potential of building materials: An application of life cycle analysis in Nepal. *Mountain research and development, 37*(1), 47–55. https://doi.org/10.1659/mrd-journal-d-15-00043.1

Bronfenbrenner, U. (1994). Ecological models of human development. *International Encyclopedia of Education, 3*(2), 37–43.

Chhaba, S., & Singh, C. (2017). Performance of Mud Brick in Building Construction system. *International Journal of Engineering Technology and Computer Research (IJETCR)*, 5(4), 128–132. https://ijetcr.org/index.php/ijetcr/article/view/417

Chongbang, N. (2022). Local and social support practices in disaster management initiatives in Nepal. *Transatlantic Journal of Multidisciplinary Research (TJMR)*, *4*(1), 22–32. https://doi.org/10.5281/zenodo.6743925

Chongbang, N., & Bharadwaj, D. (2021). Building community resilience: A study of Gorkha reconstruction initiatives. *Molung Educational Frontier, 11*(1), 101–124. https://doi.org/10.3126/mef.v11i0.37849

Creswell, J. W. (2007). *Qualitative inquiry and research design: Choosing among five approaches*. Sage Publications.

Davis, L. (2024). Policy effectiveness in sustainable housing: A rural perspective. *Journal of Environmental Policy, 32*(1), 45–60.

Gautam, D., Prajapati, J., Paterno, K.V., Bhetwal, K.K., & Neupane, P. (2016). Disaster resilient vernacular housing technology in Nepal. *Geoenviron Disasters 3*(1),1–14. https://doi.org/10.1186/s40677-016-0036-y

House, James S.; (1987). Social support and social structure. *Sociological Forum 2*(1), 135–146. http://hdl.handle.net/2027.42/45658

Jacobs, K., Kemeny, J., & Manzi, T. (2004). *Social constructionism in housing research*. Routledge. https://doi.org/10.4324/9781315242965

Johnson, R., & Lee, A. (2021). Evaluating sustainable building materials for rural housing: A life cycle approach. *Sustainable Construction Journal, 15*(3), 100–115.

Krishankumar, R., Mishra, A. R., Cavallaro, F., Zavadskas, E. K., Antuchevičienė, J., & Ravichandran, K. S. (2022). A new approach to the viable ranking of zero-carbon construction materials with generalized fuzzy Information. *Sustainability, 14*(13), 1–24. https://doi.org/10.3390/su14137691

Mason, J. (2002). *Qualitative researching*. Sage Publications.

Miller, T. (2023). Community dynamics and housing design: Cultural implications in rural settings. *Journal of Community Development, 48*(2), 112–130.

Mishra, A. K. (2018). Sustainability and risk assessment of Salyankot water supply project in post-earthquake scenario. *International Journal of Operations Management and Information Technology, 8*(1), 1–30.

Mishra, A. K. (2019a). Cost implications for the construction of earthquake-resistant load-bearing residential buildings. *Journal of Advanced Research in Geo Science and Remote Sensing, 6*(3&4), 3–15. https://doi.org/10.24321/2455.3190.201903

Mishra, A. K. (2019b). Development of building bye-laws in Nepal. *Journal of Advanced Research in Construction and Urban Architecture, 4*(3&4), 17–29. https://doi.org/10.24321/2456.9925.201904

Mishra, A. K., & Acharya, S. R. (2018). Performance assessment of Salyankot water supply project in post-earthquake scenario of Nepal. *Journal of Advanced Research in Geo Science and Remote Sensing, 5(*3&4), 23–40. https://doi.org/10.24321/2455.3190.201802

Mishra, A. K., & Thing, R. (2019). Structural features for earthquake-resistant load-bearing residential buildings in Nepal. *Journal of Advanced Research in Geo Science and Remote Sensing, 6*(1), 1–16. https://doi.org/10.24321/2455.3190.201901

Quelhas, B., Cantini, L., Guedes, J.M., Da Porto, F., & Almeida, C. (2014). Characterization and reinforcement of stone masonry walls. In: A. Costa, J. Guedes, & H. Varum (Eds.) *Structural rehabilitation of old buildings.* Building Pathology and Rehabilitation, vol 2. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-39686-1_5

Sandle, M. (2017). *Communism*. British Library Cataloguing in Publication Data.

Schiavi, A., Cellai, G., Secchi, S., Brocchi, F., Grazzini, A., Prato, A., & Mazzoleni, F. (2019). Stone masonry buildings: Analysis of structural acoustic and energy performance within the seismic safety criteria. *Construction and Building Materials, 220*, 29–42. https://doi.org/10.1016/j.conbuildmat.2019.05.192

Shrestha, M. B., Krishna, K., Tamang, T. L., & Mishra, A. (2017). Perception regarding security forces involvement in post-Gorkha earthquake scenario 2015, Nepal. *International Journal of Emerging Technologies and Innovative Research, 4*(10), 23–30.

Smith, J. (2020). Long-term ecological impacts of rural housing construction. *Ecological Research, 25*(4), 203–220.

Stake, R. E. (2010). *Qualitative research*: S*tudying how things work*. Guilford Press.

Vasić, M. V., Goel, G., Dubale, M., Živković, S., Trivunić, M., Pezo, M., & Pezo, L. (2023). Socio-economic analysis of the construction and building materials' usage—Ecological awareness in the case of Serbia. *Sustainability, 15*(5), 1–21. https://doi.org/10.3390/su15054080

Yin, R. K. (2003). *Case study studies, design and methods*. Sage Publication India Pvt. Ltd.