ANALYZING THE IMPACTS AND CHALLENGES OF NATURAL DISASTERS: A COMPREHENSIVE STUDY OF NEPAL'S 2072 EARTHQUAKE

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Abstract

This study examines the multifaceted impacts and challenges faced by Dupcheshwor Rural Municipality in the aftermath of the 2072 Gorkha Earthquake, with a focus on both immediate and long-term consequences for the local population. It adopts a descriptive research design and a mixed-methods approach, combining qualitative and quantitative data collected from 200 randomly selected households. Primary data were gathered through semi-structured interviews and focus group discussions, while secondary data were sourced from government reports, NGO assessments, and academic literature. The core findings reveal extensive destruction of homes, infrastructure, and agricultural assets, which significantly disrupted livelihoods and heightened food insecurity. Access to essential services such as healthcare, education, water, and sanitation was severely affected. Displacement and the breakdown of essential community services further complicated the recovery process. Beyond physical and economic hardships, the earthquake also had profound psychosocial impacts, particularly among women, children, and the elderly, who experienced elevated levels of trauma and emotional distress. Despite these challenges, local communities demonstrated notable resilience through mutual aid, informal networks, and self-initiated recovery efforts. However, institutional responses were hindered by inefficiencies, poor coordination, and limited reach, particularly in remote and marginalized areas. The study underscores the urgent need for comprehensive and inclusive disaster risk reduction strategies that prioritize community-based approaches, strengthen local institutional capacities, and address both structural vulnerabilities and psychosocial needs. The findings contribute to broader discussions on disaster governance by emphasizing the importance of resilience-building and equitable recovery planning in rural, disaster-prone settings.

Keywords: Disaster, Earthquake, Resilience, Livelihoods, Vulnerability

Introduction

A disaster is a sudden, catastrophic event that results in substantial damage to human life, property, and the environment, disrupting societal functioning and often exceeding the affected community's capacity to cope. It is typically sudden and unexpected, often causing substantial damage to human life, infrastructure, and socio-economic systems. Cheng and Yuan (2002) define a disaster as a massive disproportion between hostile elements and available survival resources, while Sinha (1998) describes it as a sudden calamitous event causing extensive damage and destruction. The severity and scope of disaster impacts are influenced by factors such as geographical location, climate conditions, and the vulnerability of the affected area. These events not only pose immediate physical threats but also have long-term consequences on the mental, socio-economic, political, and cultural well-being of communities.

Walter (2004) states that on average 211 million people are affected by disasters annually, resulting in significant loss of life and widespread physical impacts. These include casualties, injuries, and property damage. Accurately assessing these deaths and injuries can be challenging due to poor record-keeping or inadequate tracking systems. Physical impacts also include damage to society's infrastructure and destruction of essential resources like cropland and woodlands. These environmental damages can have long-term repercussions, impacting immediate recovery and socio-economic stability in affected regions. Properly documenting and addressing these impacts is essential for effective disaster management and response. Disasters generally have several profound effects, including the complete disruption of daily life, the degradation of natural systems, and the deterioration of essential services such as food, shelter, and healthcare, which are all contingent on the intensity and security of the event.

Wisner, Blaikie, Cannon, and Davis (2004) present a disaster typology based on two key factors: onset speed and causative factors. Disasters are categorized as either slow-onset (e.g., droughts) or sudden-onset (e.g., earthquakes), and further classified by their causes, which may be natural (e.g., hurricanes), human-made (e.g., industrial accidents), or a combination of both (complex disasters). This framework aids in comprehending the diverse nature of disaster risks and informs targeted strategies for mitigation and response. While the term *emergency* is often used in relation to disasters, it refers to a more specific and urgent event where lives and essential property are immediately at risk. In contrast, a disaster represents a broader phenomenon, characterized by a general decline in a community's or society's capacity to cope, often necessitating external intervention and extraordinary response efforts (Bankoff et al., 2003).

Nepal's geographical location makes it highly vulnerable to a range of hazards, including earthquakes, floods, and landslides. This vulnerability is amplified by factors such as its seismically active zone, variable geoclimatic conditions, unplanned urbanization, deforestation, and limited community capacity to cope. Indeed, Nepal is recognized as one of the most disaster-prone countries globally, with over 80% of its population at risk from natural hazards (The Kathmandu Post, 2019). Other South Asian countries also face significant risks from natural disasters due to shared geographical and socio-economic vulnerabilities. The 2015 Nepal earthquake, for instance, affected parts of India, Bangladesh, Tibet, Bhutan, and Pakistan. The increasing frequency of natural disasters in developing countries within South Asia is closely linked to the growing vulnerability of households and communities, where pre-existing socio-economic conditions often exacerbate the impacts and hinder recovery (World Bank, 2023).

Disasters, including earthquakes, landslides, floods, and avalanches, have consistently posed severe challenges to Nepal, largely due to its seismically active position and complex mountainous terrain. The 2072 (2015) earthquake served as a stark reminder of the country's high vulnerability, resulting in extensive loss of life, destruction of infrastructure, and disruption of essential services. Such events not only inflict immediate physical damage but also intensify pre-existing social and economic vulnerabilities, particularly among marginalized populations such as women, children, the elderly, and persons with disabilities. Recovery in the aftermath of disasters is often impeded by persistent poverty, deepening inequality, and the limited capacity of local institutions to respond effectively. Fragile infrastructure further hinders timely relief and reconstruction efforts, especially in rural and hard-to-reach areas.

Despite the increasing frequency and scale of disasters, as well as the presence of formal emergency planning mechanisms, West and Orr (2007) observe a critical gap in understanding how individuals perceive their own vulnerabilities and what motivates them to take protective actions, such as evacuation. The factors that shape these perceptions remain insufficiently explored, particularly in relation to how people assess and respond to information from governmental and non-governmental sources. Moreover, gender plays a significant yet understudied role in shaping decision-making during crises. Understanding these dynamics is essential for developing more inclusive and effective disaster risk reduction strategies, particularly in highly vulnerable contexts like Nepal.

Natural disasters and socio-economic vulnerability

Natural disasters in Nepal, such as earthquakes, floods, and landslides, have profound impacts on the country's socio-economic systems and human life. With its diverse geography and vulnerable infrastructure, Nepal faces significant challenges in managing and mitigating the effects of these disasters. The growing frequency of natural disasters is closely linked to the increasing vulnerability of households and communities, particularly in developing countries. In these areas, pre-existing socio-economic vulnerabilities often amplify the impacts of natural disasters, making recovery more difficult (Vatsa & Krimgold, 2000).

Smith (2001) outlines several key characteristics of natural disasters. Firstly, the origin of such events is usually clear, with specific threats to human life, such as drowning in floods. Secondly, warning time is typically short due to the rapid onset of these events, even within known hazard zones. Thirdly, the direct consequences, particularly in terms of loss of life and property, occur soon after the event. Additionally, exposure to risk is largely involuntary, often resulting from living in hazardous areas, such as unplanned urban expansion on unstable hillsides. Lastly, natural disasters are often of such intensity that they demand an emergency response, which can range from local to international aid efforts.

The losses from natural disasters, such as loss of life and property, are quantifiable and can be assessed through various research databases. According to Perez and Thompson (1994), natural disasters are defined as events causing widespread damage, injury, or loss of life beyond the coping capacity of the affected community. The United Nations International Strategy for Disaster Reduction (2001) further confirms that natural disasters are the result of the impact of a natural hazard on a vulnerable socio-economic system, which hampers the community's ability to cope with the disaster's effects.

Steinberg (2006) offers important insights into the perception of natural disasters, arguing that they are often viewed as random, morally neutral events beyond human control. However, by attributing blame solely to nature, society tends to ignore its own responsibilities and contributes to a collective amnesia about the underlying causes. He also suggests that blaming nature has become a political tool used by governments, the media, and policymakers.

Nepal faces a severe vulnerability to natural disasters due to climate change and environmental degradation. The country faces various hazards such as earthquakes, floods, landslides, fires, lightning, windstorms, hailstorms, droughts, and epidemics, which are intensified by factors like unplanned urbanization, deforestation, and limited

community capacity to cope. Due to its seismically active zone and variable geoclimatic conditions, Nepal is one of the most disaster-prone countries globally, highlighting the need for effective risk reduction and preparedness strategies.

Earthquakes

Earthquakes are natural events caused by Earth's tectonic plates shifting, causing ground shaking. Around one million earthquakes occur annually, with major seismic events causing extensive damage occurring once every three years. The impact usually lasts between 30 and 60 seconds, with aftershocks causing additional damage to weakened structures. The fundamental cause of an earthquake is the release of energy within the Earth's lithosphere, which generates seismic waves. This energy release can cause ground shaking that may last anywhere from a few seconds to several minutes, with the initial mild tremors sometimes escalating into violent shaking. The severity of an earthquake depends on its size, and even minor earthquakes can have lasting psychological effects. Additionally, aftershocks can continue for an extended period, compounding the stress experienced by those in affected areas. As such, earthquakes remain one of the most unpredictable and devastating natural disasters, with significant social, psychological, and economic consequences for affected communities (Perez & Thompson, 1994).

The devastation caused by the earthquake in Nepal hasn't been properly sized up yet. The fear of the earthquake hasn't left the hearts of many Nepalese. None have forgotten the pain caused by earthquakes and then may fall into facing some challenges as a consequence of coping with the shock, depending on the impact and likelihood of falling into the face of the initial stock assets and coping mechanisms. The earthquake affected manufacturing, production, and trade in agriculture as well as tourism and other areas of the service sector. On the whole, it weakened the national economy with wider ramifications. It poses a challenge to Nepal's aspiration of upgrading itself to a developing country category by 2022 and to its national commitment to poverty reduction (NPC, 2016).

Nepal has experienced numerous earthquakes throughout its history. The first recorded earthquake occurred on June 7, 1255, with an estimated magnitude of 7.7 on the Richter scale. This catastrophic event led to the death of approximately one-third of Kathmandu's population, including Abhaya Malla, the King of the Kathmandu Valley. In addition to the significant loss of life, many buildings and temples in the valley were completely destroyed, and others sustained severe damage (Paudel, 2014).

According to the Ministry of Home Affairs (MoHA) report (2015), a 7.8 magnitude earthquake struck Nepal on 12th Baisakh 2072 (April 25, 2015), with its epicenter located in Barpak, Gorkha, approximately 81 kilometers northwest of Kathmandu. The earthquake, which occurred at 11:56 am, was followed by numerous aftershocks, including two particularly devastating ones on 16th and 29th Baisakh, resulting in significant loss of life and property. The earthquake killed 8,891 people, injured 22,303, and left millions homeless. There was extensive damage to the country's infrastructure, including world heritage sites. Over 680,000 households were damaged, with around 350,000 partially damaged. Many government and public office buildings and historical, cultural, and archeological heritages were destroyed, as well as physical infrastructures like school buildings, bridges, and roads. The earthquake affected 31 districts across the central and western regions of Nepal, with 14 districts being the most severely impacted. These highly affected districts were Gorkha, Dhading, Rasuwa, Nuwakot, Kathmandu, Lalitpur, Bhaktapur, Kavrepalanchowk, Sindhupalchowk, Dolakha, Sindhuli, Makawanpur, Ramechhap, and Okhaldhunga. The destruction caused by the mainshock led to extensive damage to buildings and infrastructure in both urban and rural areas, resulting in an estimated economic loss of USD 7 billion. This earthquake was the largest to strike Nepal since the Nepal-Bihar earthquake of 1934. The disaster affected the entire country and parts of India, Bangladesh, Tibet, Bhutan, and Pakistan.

Research question

Understanding the complex and far-reaching consequences of natural disasters is critical for effective disaster preparedness, response, and recovery. In regions with fragile socio-economic structures, such as Nepal, natural disasters often exacerbate pre-existing vulnerabilities and impose long-term challenges on affected populations. The 2072 earthquake (2015), one of the most devastating seismic events in the country's recent history, had profound impacts not only at the national level but also within specific rural communities. Dupcheshwor Rural Municipality, located in Nuwakot District, serves as a pertinent case for examining how individuals and communities cope with disaster-induced disruption and loss. An in-depth investigation into the earthquake's immediate and long-term effects reveals important insights into patterns of vulnerability, the effectiveness of local and national response mechanisms, and the capacity for social and economic recovery in rural settings. In light of these considerations, the central research question guiding this inquiry is, what were the socio-economic impacts of the 2072 earthquake on Dupcheshwor Rural Municipality, and what challenges did individuals and communities face in coping with its aftermath?

Research objective

The primary objective of this study is to examine the multifaceted impacts of natural disasters and to investigate the challenges encountered by individuals, communities, and national systems in the aftermath of such events. Particular emphasis is placed on the 2072 earthquake (2015) and its effects on Dupcheshwor Rural Municipality, Nepal, to understand the specific vulnerabilities and coping mechanisms within this local context.

Theoretical debate on earthquake, 2072

The 2072 earthquake in Nepal was a catastrophic event that not only revealed the physical vulnerabilities of the nation's infrastructure but also exposed significant gaps in governance, disaster preparedness, and social resilience. From a sociological standpoint, this tragedy provides a lens through which to examine the intricate interplay of factors influencing disaster outcomes, such as institutional structures, cultural norms, economic limitations, and policy responses. Various sociological frameworks, including structural functionalism, conflict theory, systems theory, postcolonial theory, and social capital theory, offer distinct perspectives on these issues. This analysis seeks to explore the lessons Nepal learned from the earthquake through these theoretical lenses while critically addressing the necessity of sustainable disaster risk reduction.

Structural functionalism, as articulated by Parsons (1951) and Durkheim (2016), emphasizes the role of societal institutions to maintain stability and order. From this viewpoint, the devastating impact of the earthquake can be interpreted as a failure of the infrastructure and institutional mechanisms designed to support societal needs. In Nepal’s case, the collapse of buildings, insufficient disaster preparedness, and weak enforcement of building codes exposed significant dysfunctions within the state’s ability to respond to the disaster. According to functionalist theory, for a society to maintain equilibrium, all aspects must work in harmony; when one component, such as weak governance or poorly constructed infrastructure, fails, the entire system is destabilized, resulting in widespread consequences. The earthquake underscored that Nepal's institutions were not sufficiently equipped to handle such a large-scale disaster, undermining the stability of social systems. The extensive casualties from building collapses can be understood as a direct consequence of failing to integrate earthquake-resistant standards into construction and urban planning. In response, systemic reforms are necessary to enhance resilience through improved infrastructure, better enforcement of regulations, and long-term planning.

Conflict theory, rooted in the work of Marx & Engels (1848), highlights the role of power and inequality in shaping social outcomes. From a conflict theoretical perspective, Nepal's response to the earthquake can be seen as symptomatic of broader structural inequalities within society. The devastation disproportionately affected poor and marginalized communities, who, due to entrenched socio-economic disparity, were more vulnerable during the disaster. The failure to prioritize disaster risk reduction and invest in earthquake-resistant infrastructure can be viewed as a result of elite interests focusing on short-term profit at the expense of long-term public well-being. The government's historical neglect of disaster preparedness, along with weak enforcement of building codes, can be understood as a form of structural violence against the most vulnerable. Additionally, while NGOs and INGOs played a role in recovery efforts, their emphasis on bureaucratic processes rather than tangible interventions reflected how power dynamics influence resource allocation and decision-making, often sidelining the needs of the marginalized. In the future, addressing these underlying power imbalances is crucial, ensuring that disaster mitigation efforts are inclusive and equitable, particularly regarding access to safe housing and infrastructure.

Systems theory, developed by thinkers such as Bertalanffy (2008) and Luhmann (1995), views social structures as interconnected and interdependent. Through this lens, the 2072 earthquake can be understood as a failure in the adaptive capacities of Nepal's political, social, and economic systems. These systems were not flexible enough to anticipate or respond to the magnitude of the disaster, resulting in cascading failures across various sectors. The lack of preparedness was largely due to the absence of systemic thinking that integrates diverse sectors, such as infrastructure, governance, and disaster management. A systemic approach to disaster risk reduction would require the integration of earthquake-resistant infrastructure, early warning systems, public awareness campaigns, and responsive emergency management mechanisms. Furthermore, systems theory stresses the importance of feedback loops, suggesting that Nepal should establish mechanisms for learning from past disasters to inform future actions. To build a more resilient society, Nepal must focus on strengthening adaptive capacities at all societal levels, fostering greater coordination between government agencies, NGOs, and international actors.

Social capital theory, as articulated by Putnam (2000), emphasizes the role of social networks, trust, and community cohesion in addressing collective challenges. In the aftermath of the earthquake, Nepalese communities demonstrated remarkable resilience, with many coming together for mutual aid and recovery. However, the earthquake also revealed the fragility of social capital in the face of systemic failures. In rural and marginalized areas, informal networks of mutual support played a critical role in the

immediate response. Yet, these networks were not always sufficient to address larger structural issues, such as inadequate infrastructure and government response. This underscores the need for a more formalized approach to community resilience, one that combines social capital with state-level disaster preparedness, resource allocation, and effective communication systems. Future disaster preparedness in Nepal must focus not only on strengthening infrastructure but also on enhancing community networks and trust. Informal systems of support are essential in mitigating the human impact of disasters and can play a key role in recovery efforts.

In essence, the researcher followed structural functionalism theory, which is applied for the valuable insights into the challenges Nepal faces in managing disaster risk and reducing vulnerability to future earthquakes. This perspective emphasizes the need for societal institutions to maintain stability. The earthquake revealed failures in infrastructure and institutional mechanisms, highlighting dysfunctions within the state's ability to respond. The collapse of buildings due to a lack of earthquake-resistant standards is given as an example of such a failure. The 2072 earthquake exposed critical gaps in infrastructure, governance, and disaster preparedness, highlighting the need for reforms at multiple societal levels. To mitigate the impacts of future disasters, Nepal must adopt a holistic approach that integrates earthquake-resistant infrastructure, equitable disaster management policies, stronger institutional frameworks, and enhanced community resilience. Only through a comprehensive, multi-faceted strategy can Nepal hope to reduce the devastating impact of future disasters and build a safer, more resilient society.

Impacts and challenges associated with the 2072 earthquake

Natural disasters, especially earthquakes, create serious impacts and challenges for individuals, communities, and nations. They highlight the need for better preparedness, effective response systems, and long-term recovery strategies. The 2072 earthquake in Nepal, followed by several aftershocks, had a deep and lasting impact on the country. It brought about a wide range of challenges that are still being felt today. The immediate effects were devastating, including a high death toll and extensive destruction.

One of the most serious impacts was the large loss of human life. Thousands of people died, and many families were left grieving. In addition to the deaths, many people were injured, which overwhelmed the healthcare system and created a medical emergency. The physical injuries were also accompanied by emotional and psychological trauma. Many survivors faced mental health challenges and needed ongoing support. The destruction of buildings, roads, and cultural heritage sites added to the disaster's

impact. This caused serious economic problems, especially in sectors like tourism, which is a key part of Nepal's economy. With historical landmarks and trekking routes damaged or destroyed, the number of visitors decreased significantly.

Another major challenge was the humanitarian crisis that followed. Thousands of people were displaced and needed shelter, food, and clean water. Temporary settlements struggled to meet basic needs, and the spread of diseases made the situation worse. Although the government and both national and international organizations tried to respond quickly, the scale of the disaster and logistical difficulties made relief efforts very difficult.

Rebuilding and recovery became long-term challenges. The damage to infrastructure and homes required major resources and sustained efforts to restore daily life. However, progress was slow due to limited funding, government inefficiency, and political problems. As a result, many communities were left waiting for support and remained vulnerable.

In Dupcheshwor Rural Municipality, the impacts were especially severe. According to the Dupcheshwor Rural Municipality (2019), the earthquake and its aftershocks caused the deaths of 270 people and injured 384 others. Families suffered from deep emotional distress, and the destruction of homes and services disrupted daily life. Medical care was hard to access, especially in remote areas where health services were already limited. This delay in treatment added to the suffering of the injured.

The earthquake also caused major damage to infrastructure in Dupcheshwor. A total of 18,496 houses and cattle sheds collapsed, leaving many without shelter. Education was disrupted, with 338 classrooms in 57 schools completely destroyed. Six out of ten health institutions in the area were no longer functional, making it difficult to access basic medical care. Roads and footpaths were also damaged, which delayed the delivery of aid and made it hard for people to reach essential services.

Agriculture, the main source of livelihood for many, was heavily impacted. The destruction of land, irrigation systems, and farming tools reduced food production and caused economic hardship. Many farmers struggled to recover, which led to income loss and increased poverty. Furthermore, 74 drinking water projects were damaged, affecting more than 4,000 households. In some areas, long-standing water sources dried up, deepening the humanitarian crisis due to the lack of clean water. Damaged irrigation canals made it even harder to grow crops and maintain local food security. The disaster also had far-reaching social and cultural impacts. Cultural heritage sites, community buildings, and government offices were destroyed, diminishing the

region's cultural identity and weakening administrative functions. In several areas, the disappearance of natural water sources added to the community's struggle for basic survival. Collectively, these impacts highlight the multifaceted and long-term challenges faced by affected populations in the aftermath of the earthquake.

These events highlighted the deep vulnerability of Nepal to future earthquakes. Located in an active seismic zone, the country continues to face high risks. The 2072 earthquake showed the urgent need to improve building codes, strengthen preparedness measures, and build resilience. Although rescue efforts were eventually carried out, the government faced major challenges in coordinating an effective response. Delays, lack of proper roads and transport, and overcrowded airports slowed the delivery of aid, especially to rural and mountainous areas where help was most needed.

In prompt, the 2072 earthquake had wide-ranging impacts on human life, infrastructure, health, education, and the economy. It also exposed serious challenges in disaster response and recovery efforts. The experience showed that long-term planning, better coordination, and stronger infrastructure are essential to reduce the impacts of future disasters and improve resilience across vulnerable communities in Nepal.

Methodology

This study was conducted in Dupcheshwor Rural Municipality, located in the Nuwakot district of Nepal. According to the Dupcheshwor Rural Municipality (2019), the municipality comprises a total of 5,683 households. From this, the researcher selected a representative sample of 200 households using a simple random sampling technique. A descriptive research design was employed to systematically document and analyze the impacts and challenges resulting from natural disasters, with a particular focus on earthquakes.

This study employs both qualitative and quantitative data to comprehensively assess the impacts of the 2072 earthquake in this rural municipality and to explore the challenges faced by individuals, communities, and institutions in the aftermath. Primary data were collected through semi-structured interviews and focus group discussions with local residents, community leaders, and government officials. These sources provided valuable firsthand insights into the lived experiences of disaster-affected populations, highlighting personal, social, and institutional challenges encountered during recovery. Similarly, secondary data were obtained from government reports, academic publications, NGO assessments, and disaster response documentation. These sources helped contextualize the local experience within broader national and regional disaster response frameworks.

The collected data were analyzed using both qualitative and quantitative approaches. Quantitative data from household surveys were entered, coded, and analyzed using statistical software to generate descriptive statistics such as frequencies, percentages, and cross-tabulations. These helped in identifying patterns and trends related to the impacts of the earthquake and the socio-economic characteristics of the affected population. Qualitative data from interviews and focus group discussions were transcribed and thematically analyzed to identify recurring themes, perceptions, and narratives. This mixed-method approach enabled a comprehensive understanding of both measurable impacts and the deeper, context-specific challenges faced by individuals and institutions in the post-disaster setting.

The utility of this data lies in its ability to provide a comprehensive understanding of the multifaceted impacts of the 2072 earthquake on this rural municipality. Quantitative data offered measurable insights into the extent of damage, patterns of loss, and the demographic and socio-economic profiles of affected households. In contrast, qualitative data enriched the analysis by revealing the nuanced experiences, coping mechanisms, and perceptions of affected individuals and communities. Together, these data sources informed a holistic assessment of disaster impacts, highlighted systemic challenges in disaster preparedness and response, and offered evidence-based insights to guide future policy interventions and community-based resilience strategies.

Findings

Demographic characteristics of the sampled households

The demographic characteristics of the sampled households refer to a detailed examination of the key attributes of the 200 households surveyed in the aftermath of Nepal's 2072 earthquake, providing an overview of key variables such as household size, head of household, primary occupation, and education level. This analysis provides a detailed understanding of the household composition and social dynamics within the affected community.

Regarding household size, the majority of households (66.67%) consist of 4-6 members, followed by those with 7-9 members (20.83%). A smaller proportion of households (12.5%) have 1-3 members, indicating that medium-sized households are the most common in the sample. In terms of household leadership, a significant majority of households (81.67%) are headed by males, while females represent 18.33% of household heads. This reflects a predominant male leadership in household structures, underscoring potential social and cultural norms within the community.

For primary occupation, agriculture is the dominant livelihood activity, with 52.5% of households identifying it as their primary occupation. Business (17.5%), labor (13.33%), and other occupations, such as government or foreign employment (16.67%), are less prevalent. This suggests that the community is largely agrarian, with a small portion of the population engaged in business or labor-related activities. Finally, educational levels within the households reveal a mixed distribution. A substantial portion of the population has attained primary education (35%), while a slightly higher percentage (37.5%) has completed secondary education. However, there is a notable percentage of individuals who are illiterate (13.33%), and a smaller group has attained higher education (14.17%). This distribution suggests that while some educational progress has been made, there is still a considerable portion of the population without formal education beyond the primary level.

In conclusion, the demographic characteristics reflect the demographic composition of the sampled households, highlighting the predominance of medium-sized households, male-headed households, an agricultural economy, and varying levels of educational attainment. These demographic characteristics provide a comprehensive understanding of the social and economic structure of the sampled households, offering essential context for analyzing the impacts and challenges of the 2072 earthquake in Nepal.

Impacts and challenges encountered by smapled households

The 2072 earthquake in Dupcheshwor Rural Municipality caused widespread devastation, severely impacting the lives of local households. Many residents experienced significant damage to their homes, with entire structures collapsing or becoming unsafe, leaving families displaced and vulnerable. The destruction of key infrastructure, including roads, schools, and markets, further hindered access to essential services, complicating recovery efforts. In addition to the physical damage, households faced considerable economic disruption as livelihoods were lost, particularly in agriculture and small businesses. The lack of access to healthcare services, due to damaged medical facilities and insufficient resources, exacerbated the challenges. Psychosocial impacts were also profound, with many individuals, particularly children and the elderly, suffering from trauma, anxiety, and stress. Furthermore, the disruption of water and sanitation services led to heightened health risks, while the coordination of relief efforts was often slow and fragmented, further complicating recovery. The combined effects of these challenges created a multifaceted crisis, straining the resilience of individuals, families, and the broader community in the aftermath of the disaster.

Table 1 : Impacts and challenges encountered by sampled households in study area

S.N.	Impact/Challenge	Households Impact Frequency and Percentage	Details
1.	Damage to houses	180 (90%)	Major damage to houses, including structural failures, collapsing walls, and roof damage
2.	Loss of livelihoods	150 (75%)	Economic disruption due to damaged or destroyed businesses, farms, and agricultural activities
3.	Access to healthcare	125 (62.5%)	Limited access to medical facilities due to damaged infrastructure and overwhelmed health services
4.	Loss of community infrastructure	160 (80%)	Destruction of roads, schools, small markets, and community buildings impacting daily life
5.	Displacement and relocation	108 (54%)	Households forced to relocate due to severe structural damage or safety concerns
6.	Psychological impacts	140 (70%)	High levels of stress, anxiety, and trauma among residents, especially women, children and the elderly
7.	Access to clean water and sanitation	95 (47.5%)	Disrupted water supply and lack of sanitation facilities leading to hygiene and health risks
8.	Loss of agricultural assets	165 (82.5%)	Destruction of crops, livestock, and agricultural tools, leading to food insecurity
9.	Government and NGO support	168 (84%)	Challenges in accessing timely relief, lack of coordination among agencies, and delayed assistance
10.	Social and institutional challenges	110 (55%)	Breakdown of social structures and difficulties in community rebuilding and support systems

Source: Field survey, 2022.

The above table presents the impacts and challenges faced by households in the study area following the 2072 earthquake. The data reveals that the majority of households experienced significant damage to their homes, with 90% reporting structural failures, including collapsing walls and roof damage. Economic disruption was also widespread, as 75% of households lost livelihoods due to the destruction of businesses, farms, and agricultural activities. Healthcare access was limited for 62.5% of households, primarily due to damaged infrastructure and overwhelmed medical services. Furthermore, 80% of households were affected by the destruction of community infrastructure, such as roads, schools, and markets, which severely impacted daily life. Over half of the households (54%) were displaced, forced to relocate due to safety concerns related to severe structural damage. Psychological impacts were significant, with 70% of households reporting high levels of stress, anxiety, and trauma, especially among vulnerable groups like women, children, and the elderly. Access to clean water and sanitation was disrupted for 47.5% of households, heightening health risks. Additionally, 82.5% of households lost agricultural assets, including crops, livestock, and tools, leading to food insecurity. The challenges in receiving government and NGO support were also evident, with 84% of households reporting difficulties in accessing timely relief due to coordination issues. Lastly, 55% of households faced social and institutional challenges, including the breakdown of community structures and difficulties in rebuilding support systems. These findings underscore the multifaceted nature of the disaster's impact on the community, highlighting both immediate and long-term challenges faced by affected households.

Discussion

The 2072 Gorkha Earthquake resulted in widespread destruction and long-lasting hardship in Dupcheshwor Rural Municipality, disrupting nearly all aspects of life for the local population. The disaster led to severe physical damage, economic instability, and deep psychological distress. Homes were extensively damaged, forcing many families into unsafe or temporary shelters. The destruction of infrastructure, including roads, schools, health posts, and markets, severely hindered access to essential services and delayed recovery efforts. Educational institutions were damaged or destroyed, disrupting the schooling of children and limiting their future opportunities. Health services were critically impaired, as many facilities became inoperative, and access to medical care became a major concern.

The municipality's reliance on agriculture as the primary livelihood made the population particularly vulnerable to the shock. The earthquake caused the loss of agricultural assets such as land, tools, livestock, and irrigation systems, contributing

significantly to food insecurity and economic distress. Livelihoods dependent on farming and small businesses were disrupted, pushing many households into poverty. Vulnerable groups, including women, children, and the elderly, faced greater challenges in accessing aid, shelter, and resources, reflecting underlying social and economic inequalities.

In addition to substantial losses, psychological trauma was widespread. Many residents suffered from stress, anxiety, and emotional strain, yet access to mental health services was extremely limited, leaving long-term psychosocial needs largely unaddressed. Social and institutional structures also suffered, weakening community coordination and delaying effective response. Despite these challenges, localized efforts in mutual aid and rebuilding highlighted the strength of community resilience. However, institutional responses were marked by inefficiency, lack of coordination, and limited sustainability, which undermined the overall recovery process.

The broader implications of this study highlight the urgent need for integrating disaster preparedness into rural development planning. The earthquake exposed deep-rooted structural vulnerabilities in housing, health, education, and livelihoods, particularly in marginalized communities. Strengthening local institutions, improving infrastructure resilience, and promoting inclusive recovery strategies are essential for long-term sustainability. Community-based approaches and localized knowledge must be central to future disaster risk reduction efforts to ensure effective and equitable responses in similar rural settings.

This study underscores the multifaceted impacts of the earthquake, revealing critical gaps in housing, healthcare, education, infrastructure, and economic systems. It also reflects the broader socio-demographic context of a largely agrarian, patriarchal society with moderate education levels, which influenced the community's capacity to recover. These challenges point to the urgent need for improved disaster preparedness, resilient infrastructure, and inclusive recovery planning. Future disaster risk reduction strategies should incorporate community-based approaches and localized knowledge to strengthen long-term resilience and reduce vulnerability in rural disaster-prone areas.

Conclusion

The 2072 Gorkha Earthquake had profound and far-reaching consequences on the social, economic, and physical landscape of Dupcheshwor Rural Municipality. The disaster not only caused widespread destruction of housing, infrastructure, and agricultural assets but also exposed deep-rooted vulnerabilities within the community's social

and institutional systems. The impacts extended beyond immediate physical damage, affecting livelihoods, education, healthcare, and psychological well-being. Vulnerable populations, particularly women, children, and the elderly, were disproportionately affected, highlighting persistent social inequalities that influence both exposure to risk and capacity for recovery.

The study illustrates how a predominantly agrarian and resource-limited community, with limited access to services and weak institutional support, struggles to withstand and recover from large-scale natural disasters. It also reveals that while localized efforts and social cohesion played a vital role in community resilience, the effectiveness of broader institutional responses was hindered by issues of coordination, efficiency, and sustainability. The lack of mental health services and the prolonged disruption to essential services such as education and healthcare underscore the need for a more comprehensive and inclusive approach to disaster management.

To build long-term resilience in disaster-prone rural areas, there is a clear need for integrated planning that combines infrastructure development, livelihood diversification, social protection, and mental health support. Strengthening institutional capacities, ensuring equitable access to resources, and involving local communities in disaster preparedness and recovery planning are essential steps toward reducing vulnerability. Ultimately, the experiences of Dupcheshwor reflect broader national and global challenges in managing disaster risks, and they underscore the importance of inclusive, community-based strategies that address both immediate recovery needs and the structural factors that shape vulnerability and resilience.

References

Bankoff, G., Frerks, G., & Hilhorst, D. (2003). *Mapping vulnerability: Disasters, development, and people*. Earthscan.

Bertalanffy, L. von. (2008). *General system theory: Foundations, development, applications*. George Braziller.

Cheng, Y., & Yuan, Y. (2002). Improving disaster management. *Prehospital and Disaster Medicine*, *17*(S2), S15-S15.

Dupcheshwor Rural Municipality. (2019). *Dupcheshwor rural municipal profile*. https://www.dupcheshwormun.gov.np/sites/dupcheshwormun.gov.np/files/Dupcheshwor%20Rural%20Municipal%20Profile.pdf

Durkheim, E. (2016). The division of labor in society. *In Social Theory Re-Wired* (pp. 16-39). Routledge.

Luhmann, N. (1995). *Social systems*. Stanford University Press.

Marx, K., & Engels, F. (1848). *The communist manifesto*. Penguin Classics.

Ministry of Home Affairs. (2015). *Nepal disaster report 2015*. Government of Nepal, Ministry of Home Affairs.

National Planning Commission. (2016). *14th plan (FY 2073/74-2075/76)*. Government of Nepal.

Parsons, T. (1951). *The social system*. Free Press.

Paudel, T. (2014). *A report on earthquake in Nepal*. Développement et Civilisations Lebret–Irfed. Retrieved August 18, 2014, from http://www.lebret-irfed.org/spip.php?article787

Perez, E., & Thompson, P. (1994). Natural hazards: Causes and effects. *Prehospital and Disaster Medicine*, 9(1), 80-88.

Putnam, R. D. (2000). *Bowling alone: The collapse and revival of American community*. Simon & Schuster.

Sinha, P. C. (Ed.). (1998). *Encyclopaedia of disaster management*. Anmol Publications.

Smith, K. (2001). *The nature of hazard*. In *Environmental hazards* (3rd ed., p. 16). Routledge.

Steinberg, T. (2006). *Acts of God: The unnatural history of natural disaster in America*. Oxford University Press.

The Kathmandu Post. (2019, September 5). *Why floods and landslides batter Nepal every year*. https://kathmandupost.com/climate-environment/2019/09/05/why-floods-and-landslides-batter-nepal-every-year

United Nations International Strategy for Disaster Reduction. (2001). *Disaster reduction: A global review*. United Nations.

Vatsa, K., & Krimgold, F. (2000). Financing disaster mitigation for the poor. In A. M. I. L. S. R. M. S. (Ed.), *Managing disaster risk in emerging economies* (pp. 129–153). The World Bank.

Walter, J. (Ed.). (2004). *World disasters report 2004: Focus on community resilience*. Kumarian Press.

West, D. M., & Orr, M. (2007). Race, gender, and communications in natural disasters. *Policy Studies Journal*, *35*(4), 569-586.

Wisner, B., Blaikie, P., Cannon, T., & Davis, I. (2004). *At risk: Natural hazards, people's vulnerability and disasters* (2nd ed.). Routledge.

World Bank. (2023). *Climate risks, exposure, vulnerability and resilience in Nepal*. https://documents1.worldbank.org/curated/en/099062323152517268/pdf/P17454108d3f440c208af704f01d0a8bb68.pdf