

REVIEW ARTICLE

A review of disasters in Jammu and Kashmir, and Ladakh region in India

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Abstract: India has always been a disaster-prone country, with multiple states afflicted by different types of disasters. The impact of these disasters is exacerbated when an area is prone to multiple types of disasters. This study attempts to understand the impact of natural and man-made disasters on the people of Jammu and Kashmir (J&K) and Ladakh region in India as well as it also examines the resilience mechanisms adopted by the people, and identifies measures taken by the government in response to these disasters. To understand these disasters' dynamics, we conducted both offline and online desk reviews for this study. The review suggests that J&K and Ladakh region is afflicted not only by multiple natural disasters such as floods, earthquakes, avalanches, and landslides but also by the terrorism and violence, which has caused unparalleled death and destruction. These natural and man-made disasters have adversely affected most aspects of life and development in the region. To mitigate the risks, effective disaster risk reduction and management systems, early warning systems and infrastructure need to be strengthened. In addition, community engagement needs to be enhanced with the goal of addressing the grievances of the population and engaging them in the design and implementation of sustainable development programs.

Keywords: Natural disaster; Man-made disaster; Conflict; Terrorism; Violence; Jammu and Kashmir; Ladakh; India

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1. Background

Disasters are a global phenomenon. Natural and man-made disasters have had an impact on the development, economy, and health of both developing and developed nations and have put pressure on populations across the world. The United Nations International Strategy for Disaster Reduction (UNISDR) defines the term disaster as “a serious disruption of the functioning of a community or a society involving widespread human, material, economic, or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources” (UNISDR, 2009). Disasters that are the result of natural hazards such as earthquakes, floods, cyclones, and droughts are called natural disasters. Those that are the result of anthropogenic activity such as industrialization, wars, global terrorism, political conflicts, and economic crises are defined as man-made disasters (Shaluf, 2007). A combination of natural and man-made disasters has affected most countries around the world and resulted in large-scale mortality and morbidity, destroyed livelihoods, creating millions of refugees, and migrants. Around 1.3 million people died due to natural disasters between 1996 and 2015, with low-income countries recording mortality rates that were 5 times higher than high-income countries (UNISDR and CRED, 2016). On the other hand, in the year 2016, global terrorism – a man-made disaster – caused 25,673 deaths and losses of \$84 billion to the global economy (Institute for Economics and Peace, 2017).

As a result of its geographical and climatic conditions, poor socio-economic profile, and numerous terrorisms-based violence, India is afflicted by multiple disasters. Over a period of 20 years, from 1996 to 2015, natural disasters killed 97,691 people in India. This represents the fifth highest mortality rate in the world (UNISDR and CRED, 2016). India has also been affected by violent man-made disasters in the form of wars, insurgency, and terrorism. The Bhopal gas tragedy in 1984 remains the country’s worst industrial disaster thus far. The recently bifurcated union territories (UTs) of Jammu and Kashmir (J&K) and Ladakh (hence forth has been used as J&K and Ladakh region) in the northernmost part of India, is one of the most severely affected regions by both natural (Table 1) and man-made disasters. It is a region prone to multiple hazards on account of its topography and varying, extreme climate. The region has suffered massive floods, devastating earthquakes, and recurrent avalanches and landslides (SDMP, 2017). The earthquake in 2005, flash floods and landslides in 2010, and the massive floods of 2014 are among the major natural disasters the state has faced over the past 15 years (Kumar, Martha, and Roy, 2006; Gupta, Khanna, and Majumdar, 2012; SDMP, 2017). The state has also borne the brunt of disputes between India and Pakistan, witnessing regular cross-border infiltrations, state-sponsored terrorism, and violent attacks. The displacement of communities from their homelands, long-drawn-out protests leading to curfews, and regular clashes between terrorists and armed forces, have been some of the manifestations of the violence (Shekhawat, 2009; Behera, 2016).

This combination of natural and man-made disasters has had adverse effects on key facets of J&K and Ladakh region’s economy, including key sources of revenues such as agriculture, horticulture, handicrafts, and tourism (Sharma, Sharma, and Waris, 2012). These disasters have stretched the administrative machinery of the region and left its population vulnerable. However, there are lack of studies which have focused on the aftermath of specific natural disasters and incidents of terrorism and violence as a form of disaster. There have been lack of studies which have explored the impact of natural and man-made disasters on people’s lives and development in a comprehensive way. This article attempts to review the impact of different natural and man-made disasters (e.g., terrorism and violence) on the people of J&K and Ladakh region. It reviews the impact of disasters and the mechanisms of resilience adopted by the people of the region, and identify measures taken by the government in response to these disasters.

1.1. Geography and Weather

As per the recently formed UTs of J&K (as of October 31, 2019), UTs of J&K has 20 districts and UTs of Ladakh has two districts, both combined covering the geographical area of 222,236 km² (Census of India, 2011). The climatic conditions vary from tropical heat in Jammu, to temperate conditions of the Kashmir valley, to the arctic cold of Ladakh. There is large variation in temperature from the average maximum of 33°C (Jammu) in summers to the average minimum

Table 1. Deaths due to natural disasters in India and J&K and Ladakh region, 2005-2018.

Year	Deaths due to natural disasters	
	J&K (including Ladakh)	India
2005	1157	22,415
2006	345	21,502
2007	278	25,153
2008	307	23,993
2009	226	22,255
2010	575	25,066
2011	314	23,690
2012	321	22,960
2013	308	22,759
2014	518	20,201
2015	387	10,510
2016	280	8,684
2017	127	7143
2018	131	6891

Source: National Crime Records Bureau, Ministry of Home Affairs, Government of India.

of -14.4°C (Ladakh) in winters. The average annual rainfall for the region is 1028 mm with the months of July and August experiencing the maximum rainfall (IMD, 2014). Agriculture is the direct and indirect source of livelihood for the majority (75%) of the population while paddy and wheat are the two major crops. Sharecropping along with goat and sheep rearing is the sources of livelihood for the nomadic communities. Rain is the major source of irrigation followed by spring irrigation and nallah irrigation (SDMP, 2017).

2. Key Findings

2.1. Impacts of Earthquakes

Situated next to the Himalayas, J&K and Ladakh region falls in a mountain building geological zone and thus experiences recurring seismic activity (Hassan, 2014). It is an earthquake-prone area that falls under the most active seismic zones in India (Zones IV and V). It has endured several earthquakes over the years. Between 1889 and 1990, 170 earthquakes were recorded in the region (Hassan, 2014). The year 1885 witnessed one of the deadliest earthquakes to strike the region, the effects of which were felt from Srinagar to Gilgit and to Shimla in the neighboring state of Himachal Pradesh (Anees and Bhat, 2016).

In 2005, a major earthquake – with a magnitude of 7.6 on the Richter scale – struck the border region between India and Pakistan. The fallout affected both countries. More than 80,000 people – majority of them in Pakistan – lost their lives, resulting in an enormous humanitarian crisis (SDMP, 2017). The earthquake also resulted in injuries to approximately 100,000 people in Pakistan and about 6300 people in India (Ali, Mir, Jabeen, *et al.*, 2010). It is considered the deadliest earthquake in the recorded history of the Himalayan region (Anees and Bhat, 2016). Around 1300 of those killed were from Uri in Baramulla district of J&K. The township saw severe damage to most of its buildings, with 121 of them collapsing completely and many villages in the vicinity were severely affected by the earthquake (Kumar, Martha, and Roy, 2006). Kumar *et al.* (2006) also highlighted using remote sensing satellite data that the earthquake and the subsequent landslides resulted in collapse of 25% of the buildings in Uri and Poonch townships, collapse of bridges, and road blockage.

In the regions of J&K and Ladakh, earthquakes not only cause immediate destruction but also long-term damage to the socio-economic condition of the people in the region (Shah, Khwaja, Shah, *et al.*, 2018; Yousuf, Bukhari, Bhat, *et al.*, 2020). The collapsed houses left entire families homeless and the impact on hospitals and government buildings interrupted health and other essential services when they were most needed (Hamilton and Halvorson, 2007). A study on the morbidity patterns of victims of the 2005 earthquake reveals that a majority of the 6270 injured suffered upper and lower limb injuries, followed by spinal injuries (Ali, Mir, Jabeen, *et al.*, 2010). A study based on the mental health services provided in the region revealed that within 6 weeks of the earthquake, majority of the respondents had severe psychological impacts, with adjustment disorders (39.6%), depressive episodes (21.8%), anxiety (4.6%), and post-traumatic stress disorder (PTSD) (3.3%) being the most common (Chadda, Malhotra, Kaw, *et al.*, 2007). This study noted that a major concern reported by people was the lack of basic mental health services outside the city of Srinagar, which can be a journey of up to 8 h for people from the remote areas of the region.

With existing inequalities interacting with a natural hazard, the earthquakes also had a devastating impact on the women of J&K. Women faced an environment of increased personal insecurity and psychological stress due to a lack of sanitation facilities and immediate food insecurity due to their social responsibility as caretakers of the family. The disruption in health and reproductive facilities also had severe impacts on pregnant women (Hamilton and Halvorson, 2007).

2.2. Impacts of Landslides

Landslides are another geological hazard common in J&K and Ladakh region. The region is home to young mountain ranges, which have a fragile rock base that can trigger a flow of debris, mud, and rocks when the stability of the slope gets disturbed. Heavy rainfall, cloudbursts, and earthquakes can trigger landslides. Anthropogenic activities such as deforestation, road construction, and other unsustainable development activities have further increased the vulnerability of the area (Singh, Bhat, Sharma, *et al.*, 2012). Most of the areas in J&K are prone to landslides, with the districts of Bandipora, Kargil, Anantnag, Kishtwar, Pulwama, and Shopian being highly susceptible (SDMP, 2017). The environmentally fragile region of Ladakh has also been adversely affected by human activities such as encroachment of hill slopes, forest fires, terrace farming, and vibrations through heavy vehicular transportation, making it a highly vulnerable zone for landslides and mudslides (Barnard, Owen, Sharma, *et al.*, 2001).

In 2010, the Ladakh region witnessed one of its most destructive landslides as a result of a cloudburst. The extreme rainfall triggered multiple landslides and flash floods, leading to the deaths of 234 people with foreigners accounting for

about 10% of the deaths (Gupta, Khanna, and Majumdar, 2012). The flow of debris from the hills wreaked havoc on its path, destroying hospitals, houses, roads, bridges, farmland, and other infrastructure. The traditionally built houses of Leh and Ladakh were severely damaged, with over 1000 houses completely washed away by the flow of debris (Gupta, Khanna, and Majumdar, 2012). Roads were damaged and freshwater supply was interrupted due to the destruction of many canals. The destruction of storage facilities and difficulties in transportation due to heavy rainfall resulted in a temporary shortage of food supply. The destruction of hospitals and lack of sanitation facilities meant that public health was also severely affected. The remoteness of certain areas also meant that the availability of health services was further delayed (SDMP, 2017; Gupta, Khanna, and Majumdar, 2012).

Singh *et al.* (2012) argue that unplanned development in the form of construction of roads and dams is the major cause of landslides in the region. The landslide on the Batote-Doda road along National Highway 1B in 2009 was a case of slope failure resulting from the construction of the Baglihar hydro-power project. It washed away 150 m of the highway, killed one person, and affected the daily lives, livelihoods, and food security of 600,000 people for over a month (Singh, Bhat, Sharma, *et al.*, 2012). Mining sites in the region are also located in highly landslide-prone areas. Laborers work under conditions of constant risk and the mining endangers the fragile environment, creating a vicious cycle. The influx of tourists and the simultaneous infrastructural development – while positively affecting the J&K and Ladakh region's economy – has also made its environment more fragile and prone to natural hazards such as landslides (SDMP, 2017; Verma and Mushtaq, 2013).

The blocking of highways and other roadways, which leads to a disruption of normal life, is a common occurrence across the region during landslides. The Jammu-Srinagar Highway, a lifeline of the Kashmir valley, gets blocked every year due to landslides and results in hundreds of vehicles being stranded (Indian Express, 2018). This also prevents essential commodities from reaching the valley, creating shortages, and increasing prices. Cultural and religious activities such as the Amarnath yatra have also been interrupted from time to time due to landslides. Landslides cover agricultural land with debris and mud, damaging crops and making the land uncultivable for a long period of time (SDMP, 2017). This has an enormous impact on the livelihoods of farmers and of nomadic communities that live in hilly regions. The annual migration of the nomadic communities gets affected by the blocked roads. Landslides also cover large areas, preventing them from grazing their animals (Anees and Bhat, 2016). Like most other disasters, landslides have a severe impact on women due to existing social inequalities. There have been few studies on the psychological impacts of landslides in J&K. However, studies conducted in other parts of the world show that survivors of landslides are more likely than others to experience PTSD (Catapano, Malafrente, Lepre, *et al.*, 2001).

2.3. Impacts of Floods and Avalanches

Flooding is one of the most common and also one of the most devastating natural disasters across the world (CRED and UNISDR, 2015). It is generally a result of overflow of water due to rainfall, melting of snow, or other natural causes, which ends up submerging an area of land. Besides these natural causes, there are human activities such as deforestation, rapid and unplanned urbanization, construction of dams and bridges without proper research, and changing patterns of vegetation that make an area more vulnerable to flooding. The region is prone to floods, with major rivers such as Jhelum, Chenab, and Indus flowing through its populated areas (SDMP, 2017). Kashmir valley's bowl shape, with its vast variation in altitudes, makes the low-lying areas of the region specifically prone to floods. In the two-major urban centers of the region – Jammu and Srinagar – the number of wetlands such as lakes and ponds, which act as natural sponges, have come down severely, resulting in frequent urban flooding (Gupta, 2014).

In September 2014, extremely heavy rainfall led to one of the most severe and widespread instances of flooding in the region. The Jhelum, Chenab, and Tawi basins were overflowing as the amount of rainfall received in just few days was 2-6 times (depending on location) the monthly normal for September (SDMP, 2017). The floods severely affected ten out of 22 districts in the region, with districts in southern part of Kashmir being severely affected. About 30% of the urban area in the region was submerged and 2600 villages were affected with 400 being completely submerged (Vithalani and Bansal, 2017). The floods were followed by landslides that damaged roads and bridges, including one that washed away 50 people in a bus in Rajouri district (Gupta, 2014). More than 300 people lost their lives during the floods and lakhs of people were displaced as more than 80,000 *pucca* houses and about 21,000 *kachha* houses were completely damaged (Vithalani and Bansal, 2017). Multiple roadways across the region were blocked for days, including the Jammu–Srinagar highway, which remained closed for over 3 days, disrupting relief measures (Gupta, 2014). Farmers suffered huge losses as crops were destroyed, agricultural land was inundated, and thousands of animals reared for animal husbandry perished (SDMP, 2017; Shah, Khwaja, Shah, *et al.*, 2018). In the immediate aftermath of the floods, food security was a serious concern. A study claimed that 86% of respondents in Kashmir and 36% in Jammu reported a decrease in food consumption (Sphere

India, 2014). There was also a substantial decrease in the usage of piped water in affected villages as water resources were severely damaged (Gupta, 2014). The region's healthcare services were completely overwhelmed, with four out of five hospitals in Kashmir unable to function due to the floods (Vithalani and Bansal, 2017). The shortage of medical supplies affected the most vulnerable members of the society, such as the old and physically challenged and those suffering from chronic diseases such as diabetes and cancer. Disruption of electricity and damaged equipment in GB Pant hospital in Srinagar resulted in the deaths of 20 neonates (Venugopal and Yasir, 2017). There was an increase in mental illness cases in the hospitals of Srinagar, with people showing early symptoms of PTSD (Tabish and Nabil, 2015).

The floods have had a long-term impact on the people of J&K as they had not only lost their homes but also their livelihoods, livestock, and important documents. The Federation of Chamber of Commerce in Kashmir estimated the economic loss to the region till 2017 at around \$15 billion (Tabish and Nabil, 2015). The education of thousands of students across the region was affected as several government and private school buildings collapsed, leaving students without essential infrastructure (Venugopal and Yasir, 2017; Tabish and Nabil, 2015). As with all-natural disasters, women were affected even more than men because of existing gender inequalities and different social and cultural expectations. Their sanitation and reproductive health needs came under severe stress and their role as provider for the family led to considerable mental trauma. The lack of proper sanitation facilities in the relief camps and the lack of privacy for breastfeeding infants emerged as major issues for women in the aftermath of the floods (Gupta, 2014). Flooding of homes and the ensuing destruction caused severe psychological stress among people and aggravated existing mental health conditions. A study conducted 6 months after the year 2014 flood in Kashmir described that 60% of the population was suffering from severe PTSD (Fatima and Maqbool, 2017). The study also found that women and all elderly members of the society (above 60 years) were more affected by mental health issues such as depression and PTSD in the aftermath of floods.

Flash floods are extreme and sudden events that are usually triggered by a cloudburst or by the failure of dams. They trigger a high velocity current of water, submerging an area downstream within minutes or hours (SDMP, 2017). They usually occur in areas with steep slopes and, because of their sudden nature, can result in huge damage. Anthropogenic activities such as deforestation and unscientific road construction, which can trigger landslides, worsen the effects of flash floods. The cloudburst in the Ladakh region in 2010 resulted in the Indus river and its tributaries overflowing, triggering flash floods, and landslides. This led to the deaths of 234 people in the Ladakh region, left 800 injured, and caused many others to be washed away by the water and debris (Gupta, Khanna, and Majumdar, 2012). Transport was disrupted as many roads were washed away and the airport at Leh was flooded. Many buildings suffered severe damage with around 1000 houses completely collapsing. The damage was not limited to Ladakh region, with around 71 deaths being reported in 11 other districts (SDMP, 2017). Leh historically suffers a from lack of drinking water and sanitation facilities. These were further exaggerated by the flooding. Being a tourist destination, Ladakh was further hampered economically due to the destruction of tourist infrastructure. The district of Baramulla also suffered major losses of around \$8.7 million in the agricultural sector and \$8.3 million in the horticulture sector (SDMP, 2017).

Given the presence of the Himalayas in the region, J&K and Ladakh are also prone to avalanches. An avalanche is the flow of snow down a mountain slope and is very common in the high ranges of J&K (SDMP, 2017). Avalanches generally occur during episodes of heavy snowfall which can be attributed to the rising global temperature because of climate change (Rafiq and Mishra, 2018). Higher reaches of Kargil and Ladakh and the valleys of Kashmir and Gurez are the most avalanche-prone areas of the region (Hassan, 2014). Avalanches can also be highly difficult to predict and usually occur over a short period of time. The downward movement of snow can bring with it ice, soil, trees, and rocks, causing destruction to life and property (Ganju and Dimri, 2004). One of the most destructive avalanches struck the region in 1995, resulting in the deaths of 150 people and the closing of the Jawahar tunnel on the Jammu-Srinagar highway (Hassan, 2014).

Avalanches have also proven deadly for the Indian armed forces as they are normally posted in inhospitable locations of the region. An avalanche in Gurez sector in 2017 killed 20 army men and four civilians and caused destruction to a tourist place (Rafiq and Mishra, 2018). Avalanches also lead to the blocking of roadways, creating shortage of essential commodities. They essentially paralyze the life of the communities living in the high mountainous areas of the region, while also resulting in economic losses due to the impact on tourism. Agriculture is impacted for a longer term as large-scale movement of snow causes soil erosion making the soil unproductive (Ganju and Dimri, 2004). Historically, J&K and Ladakh has been a region with abundant water, but with rapid urbanization and increase in global temperatures, occasional droughts have become a reality for the majority of the region (Hassan, 2014).

2.4. Impacts of Man-made Disasters

Almost all-natural disasters in J&K and Ladakh region are, to an extent, exacerbated by human activities and their destructive potential is linked to human actions. Man-made disasters, on the other hand, are completely dependent on

human actions. The political conflict stretching back to India's independence has contributed to the most lethal, destructive, and continuous man-made disaster in the region. The region went through multiple crises in terms of violent insurgency and terrorism from the neighbor country in the Kashmir valley after India's independence (Bose, 2003). There were repeated instances of violence against the region's minority Pandit community, leading to a mass exodus of the Pandit community from the valley in 1990 (Shekhawat, 2009). In recent times, the region has witnessed large-scale protests and stone pelting as a form of collective civilian resistance, along with a new wave of militancy (Behera, 2016).

According to the South Asia Terrorism Portal (SATP), the militancy or terrorism in J&K and Ladakh region over the past three decades has led to 47,689 deaths between 1988 and July 30, 2020; among the casualties were 15,138 civilians, 6979 security personnel and 25,572 terrorists (SATP, 2020). The terrorism-based violence has also displaced lakhs of people – the majority among them being Kashmiri pandits. The people of the region continue to live in a heavily militarized zone under the constant threat of violence and terrorism. Normal life gets disrupted on a regular basis and a small incident can result in large-scale protests and violence (Behera, 2016). Violence has not only led to physical injuries and deaths but also resulted in the disruption of daily life. The family structure comes under stress, traditional and cultural events lose significance or get banned for security reasons, and overall community life gets affected (Amin and Khan, 2009). The violence has impacted the growth of children as they have been born and raised in a militarized zone that regularly witnesses violence. Growing up in a society ravaged by violence has not only hampered their mental growth but also their cultural growth (EFSAS, 2017).

All these factors lead to high prevalence of stress, trauma, and deep and lasting psychological impacts on all sections of the population. A study conducted in Kashmir highlights that about 55% of the population suffers from some level of depression and that the condition is much more prevalent in rural areas compared to urban areas as socio-economic factors add to factors like violence (Amin and Khan, 2009). Disability and violation of modesty (Violation of modesty is the local equivalent for sexual violence and includes inappropriate touching, in accordance with the WHO's definition of sexual violence) are the most common factors that cause psychological stress among men, whereas for women, the most common factors are exposure to violence and a sense of powerlessness (De Jong, Ford, Van de Kam, *et al.*, 2008). In the 1990s, the threat of sexual violence was used to terrorize the Pandit community (Shekhawat, 2009). Over the years, the terrorism-based violence in J&K has resulted in the deaths of many more men than women, leaving behind thousands of widows (Qayoom, 2014). A number of men have disappeared during the violence with no proof of death and their wives are referred to as half-widows (Qutab, 2012). The widows and half-widows, who were mainly dependent on their husbands economically and socially, have to struggle for their daily survival. Widows from poor backgrounds with no education have found difficulty in getting jobs other than manual labor (Qayoom, 2014). Half-widows not only suffer from economic deprivation but also stigma and psychological problems as they are unable to get closure due to the uncertainty that persists about their partners and their possibility of returning (Qutab, 2012).

The terrorism in J&K has had a major impact on the economic condition of the region. Due to the terrorism, in 1989, private investment in the region came to a complete halt and the economy of the region grew at a much slower pace than the rest of the country, resulting in high unemployment rates – especially in the private sector (Mahapatra and Shekhawat, 2008). Given the security concerns, the limited resources of the region are often diverted toward internal security and policing. The periods of violence have affected sources of livelihood—especially tourism, horticulture, and handicraft industries. The horticulture industry considered the backbone of Kashmir's rural economy, with numerous orchards producing apples, strawberries, almonds, walnuts, and saffron, was severely affected during the 1990s (Sharma, Sharma, and Waris, 2012). Kashmir was once India's favorite tourist destination, but as the terrorism raged on, the industry declined, affecting the livelihoods of thousands of people.

The number of tourists visiting J&K and Ladakh declined from 557,974 in 1989–2002 to 199,326 in 1993 (Sharma, Sharma, and Waris, 2012). The progress on increasing the footfall of tourists back to the previous levels has been marginal. This is reflected by the fact that only 27,358 tourists visited the region in 2002. Thus, during the most violent years of the terrorism, from 1989 to 2002, the valley lost an estimated 27 million tourists leading to tourism revenue loss of approximately \$3.6 billion (Sharma, Sharma, and Waris, 2012). Major tourist destinations and historical sites became militant hideouts. Terrorists attacked both Indian and foreign tourists, with tourist hotspots like Srinagar Airport being repeatedly attacked (EFSAS, 2017). It severely hampered the business of hotels and houseboats, while also crippling the handicraft industry that is dependent on purchases by tourists (EFSAS, 2017). In recent times, the number of tourists visiting the Jammu and Ladakh regions has grown faster compared to the Kashmir valley, which used to be the central attraction for tourists in the pre-insurgency days (Sharma, Sharma, and Waris, 2012). A study by Barbhuiya and Chatterjee (2020) also highlights that severe conflict or violence events affect domestic tourist arrival negatively, while natural disasters negatively impact international tourist arrival. Education also suffered during the conflict, with schools and colleges remaining shut during

militant attacks, protests, and indefinite strikes. Academic schedules have been disrupted and education has taken a back seat, with violence and anger taking their place, resulting in the loss of human talent and potential (EFSAS, 2017). The impact of violence on education and the economy has led to the reduction of job opportunities and this has created a generation of young people living in despair who can be potential recruits for militant activities.

2.5. Community Resilience and Government Measures on Disasters

In the aftermath of disasters, among the widespread death and destruction, individuals and communities have adopted various mechanisms to cope with the situation. This coping ability is directly linked to the vulnerability profile of the individual or the group. The vulnerability is determined by social and economic conditions such as age, gender, health, occupation, and other factors (SDMP, 2017). The ability of the population to cope with these natural disasters could also be linked to the socio-political history of the state, as noted in a study by Rakesh Chadda and others after the 2005 earthquake. The study argues that the years of violent conflict could have better equipped the people of the region to cope psychologically with natural disasters and to survive in tough conditions (Chadda, Malhotra, Kaw, *et al.*, 2007).

The social capital approach has been a key coping mechanism whereby people have gone out of their way to help each other, as was the case in the aftermath of the floods of 2014. Due to the lack of an early warning system, people were forced to evacuate in a hurry as the water level rose, which resulted in preventable losses. The Indian Army has been a key institution regarding the disaster relief in the regions of J&K and Ladakh. The army and the National Disaster Relief Force were brought into action and played a significant role in the rescue operations in 2014 (Venugopal and Yasir, 2017). The army also set up medical camps in flood-affected areas and a study shows that this played an important role in the aftermath of the disaster, but the low supply of certain drugs and the limited number of doctors available restricted the utility of these camps (Singh, Hasan, and Kasi, 2016). While the army and other administrative organizations did their best during the flood, it was the local youth networks that went out of their way to rescue people – including tourists – with the help of small boats and tyres (Venugopal and Yasir, 2017). There was also material help from other parts of the region in the form of food materials such as milk, vegetables, and rice, which helped people sustain themselves in the immediate aftermath of the floods (Bukhari, 2014). Organizations that are normally opposed to each other – such as the armed forces, non-government organizations (NGOs), separatists, and local youth – were all working toward the same goals during the natural disaster (Venugopal and Yasir, 2017). Women have played an important role in the event of disasters. In the aftermath of the earthquake in 2005, women organized relief efforts, helped in the building of temporary shelters, and prepared food in the aftermath of the earthquake (Hamilton and Halvorson, 2007).

The continuous presence of the armed forces in the rural and urban areas of J&K due to violence and terrorism has made the region a highly militarized zone. To avoid the constant patrolling by the armed forces, people have put up barriers made of rocks and pipes outside neighborhoods (Anjum and Varma, 2010). A study found that people living in J&K have reduced the number of times they leave their homes – especially during violent flare-ups (Khan, Ayoub, and Tahir, 2013). The age-old Kashmiri practice of storing dried foods and pickled vegetables due to the inaccessibility of the terrain during winters has re-emerged because of the conflict. People have been storing large quantities of food and grains at home as a way of coping with unforeseen circumstances such as prolonged protests and stringent curfews (Anjum and Varma, 2010). Displacement or migration is another coping mechanism. The biggest displacement from Kashmir was in the 1990s, when almost the entire Kashmiri Pandit community migrated to Jammu and other parts of India to escape the violence in the valley. Even after three decades, the community continues to live in exile (Shekhawat, 2009). There have also been other forms of displacement that is more cyclical in nature. People living in the border regions regularly migrate to more inner areas when increased tensions between India and Pakistan lead to cross-border shelling. In 2018, more than 1,000 people migrated from Uri district after heavy firing from across the border (SATP, 2020). A study conducted in the district of Srinagar found that people are open to migrating out of the conflict zone, but socio-economic conditions, and family and work commitments inhibit this migration (Khan, Ayoub, and Tahir, 2013).

During sudden and destructive disasters such as flash floods and landslides, it becomes imperative that the state machinery responds quickly and effectively to help people cope with the disaster. When flash floods and landslides wreaked havoc in Ladakh, the army, along with the civil administration and local people, launched massive search operations using army helicopters (Gupta, Khanna, and Majumdar, 2012). Due to concerns of contaminated water, purification units were installed to serve communities. Similarly, in the aftermath of the floods in 2014, Kashmiri student organizations from Delhi and other parts of India played an important role in helping people cope with the hazard (Venugopal and Yasir, 2017). The government has also followed a policy of providing compensation for the losses incurred by the people due to disasters. The central government provided \$720 million in multiple packages to the government of J&K (then state of J&K) for relief and rehabilitation after the floods of 2014 (SDMP, 2017). After the avalanche in 2018, the erstwhile

state government provided relief of \$5715 to the kin of those killed and \$172 to the injured in accordance with the policy of State Disaster Relief Fund (SDRF) (New Indian Express, 2018; SDRF, 2015). The government has also attempted to integrate Disaster Risk Reduction with schemes such as Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) and Indira Awas Yojana to enhance the capacities of the most vulnerable sections of the population (SDMP, 2017). MGNREGA is integrated with disaster management by focusing on generating work related to water harvesting, management of irrigation canals, flood control in water-logged areas, tree plantation, and renovation of traditional water bodies. The government has also promoted crop diversification and implemented crop insurance schemes to create a level of security against disasters for the rural population (SDRF, 2015). The J&K government had aimed at a growth rate of 4% in the agricultural sector by giving access to quality inputs such as seeds and fertilizers and by giving better inputs on soil and water management to the farmers (GOJ&K, 2013). Self-help groups (SHGs) have also been initiated by the government and the NGOs, with a special focus toward women. Women's SHGs have promoted micro-credit schemes, generated self-employment by promoting activities such as carpet weaving and goat and sheep rearing (Irshad and Bhat, 2015). This has helped in building capacity of women in rural areas and made them active participants in the development of the state and increased its resilience to disasters.

The victims of terrorist attacks in the region have also been provided compensation. In 2017, the government of the erstwhile state of J&K announced compensation of \$8572 for the kin of the deceased after the attack on Amaranth pilgrims (Jameel, 2017). In 2015, the central government instituted measures to provide a monthly pension – apart from the one-time compensation – to widows of civilians killed in militant violence (GOI, 2008). A monthly cash relief of \$36 (with a maximum of \$145 per family) is also provided to Kashmiri migrants living in Jammu (GOI, 2015). The State Rehabilitation Council (SRC) has instituted schemes to rehabilitate thousands of women who have become widows over the many years of militancy. It also offers a one-time remittance of \$290 for widow remarriage (GOI, 2008). Himayat, a scheme sponsored by the Government of India, was launched in 2011 as a skill development and placement program with the goal of providing jobs for the youth of the region (GOI, 2011). It aims to provide jobs for 100,000 youth with socially backward youth and school and college dropouts being the priority. There is also a youth exchange program under the project *Watan Ko Jano*, run by the SRC of J&K and Ladakh region, that aims to positively influence children between the age of 14 and 24 – especially orphans of militant violence (GOJ&K, 2015).

3. Discussion

The previous sections of this article have clearly outlined the devastating effects of disasters on the everyday lives of the people. These disasters have caused death, physical and mental trauma, destroyed livelihoods, and affected the economy of J&K and Ladakh region. Landslides and avalanches have been the most common natural disasters in the region, while floods and earthquakes, though less common, have caused more death and destruction. The 2014 flood was the most widespread natural disaster in the region in recent times while the 2005 earthquake proved most fatal. This study has also underscored the importance of human activity in disaster management – the frequency of disasters and their destructive potential increases due to unscientific and unsustainable development. The study also shows that while natural disasters have caused great death and destruction, terrorism, and violence have been even more destructive in the region, causing deaths of more than 20,000 civilians and security personnel, and displacing lakhs of people. Disasters have affected every aspect of life in the region – from industries such as agriculture, handicrafts, and tourism to the physical and mental health of people.

This study effectively synchronizes other studies (Sharma, Sharma, and Waris, 2012; Vithalani and Bansal, 2017) that have assessed the impact of disasters in the region in a comprehensive manner. The decline of the tourism industry, a lifeline of the region's economy, has led to increased levels of unemployment, which has created further disillusionment – especially among the youth of the region. This lack of jobs, when combined with the ongoing violence and widespread feeling of injustice, can lead to more and more youth getting attracted to the terrorism and armed struggle. In fact, conflict, terrorism, and disaster have created a vicious cycle, where development is hampered due to the ongoing violence and the lack of development creates unemployed youth, who then become potential recruits for terrorist organizations seeking to further the violence.

Mental or psychological health is an important aspect of human life that is impacted during both natural and man-made disasters. Conventionally, it has not got the importance it deserves. This study also contrasts the incessant and relentless nature of the violence with the more sporadic nature of natural disasters. The physical and mental trauma caused by disasters has been highlighted throughout this study. A natural disaster or a violent attack immediately results in major challenges for the under-equipped and overcrowded health sector of the region, as was evident after the floods in 2014

(Vithalani and Bansal, 2017). The widespread violence, repeated disruptions to daily life, and the militarized nature of the region have had an adverse psychological impact on the people. Numerous studies have underlined that the prevalence of stress, trauma, and depression is quite common among the people and is directly linked to their exposure to the violence in the Kashmir valley (De Jong, Ford, Van de Kam, et al., 2008; Amin and Khan, 2009; Housen, Lenglet, Shah, et al., 2019; Wani, Suhaff, Khan, et al., 2020). Another study after the earthquake in 2005 also highlighted the psychological impact of natural disasters, with depression, acute stress, and sleep disturbance being widely reported among the affected population (Chadda, Malhotra, Kaw, et al., 2007). The conflict in Kashmir has also left thousands of women as widows and half-widows in a volatile and patriarchal society where sexual violence against women is widely prevalent (Qayoom, 2014; Qutab, 2012). Further, in the aftermath of a natural disaster, women are confronted with an atmosphere of increased insecurity and stress and a lack of privacy, sanitation, and reproductive facilities (Hamilton and Halvorson, 2007; Kelman, Field, Suri, et al., 2018). In fact, natural disasters could potentially have a greater psychological impact on the people of the region than others due to the existing trauma arising from the violent conflict and due to the lack of resources to deal with mental health issues. The health facilities in the region require better infrastructure, more trained doctors, and mental health practitioners – especially in the rural and remote areas. Mental health needs to be a specific and ongoing focus. As the present study shows, psychological stress, trauma, and depression are widespread among the populace. The region also lags in health insurance coverage with only 4.2% of households having any insurance (GOI, 2017).

The study, while focusing on the impacts of natural and man-made disasters on the people of J&K and Ladakh region, also shows the linkages between the two types of disasters. First, the severity of natural disasters and their impact on people is largely determined by human activity. The impact of an earthquake is largely determined by the quality of the construction of buildings, whereas in the case of floods and landslides, human activities such as deforestation, urbanization, unscientific construction, and mining determine the extent of damage caused (Barnard, Owen, Sharma, et al., 2001; SDMP, 2017). Second, the extent of damage can be minimized by immediate and effective responses taken in the wake of the disaster. The response by the government after the flash floods in Ladakh in 2010 was considered mildly effective, whereas there was a widespread perception of government failure, inadequate preparation, and poor relief measures in the aftermath of the 2014 floods (Venugopal and Yasir, 2017; Gupta, Khanna, and Majumdar, 2012). The floods laid bare the lack of warning systems, the poor levels of preparation of the authorities, and the inadequate relief and rehabilitation measures (Venugopal and Yasir, 2017). Third, conflicts, while being rooted in their specific histories and the prevalent political and social condition, are also impacted by natural disasters. The destruction caused by natural disasters creates conditions of resource scarcity, aggravates pre-existing inequalities in the society, and can lead to a general sense of grievance among people, thus further aggravating the conflict. A study using the data from the second half of the 20th century concludes that the risk of violent conflict increases in the short- and medium-term after a rapid-onset disaster like a flood or an earthquake (Nel and Righarts, 2008).

The government has taken steps to mitigate the effects of disasters by integrating livelihood schemes with disaster management, by promoting crop diversification, crop insurance, and by providing compensation to people affected by disasters. It has also made efforts to implement an extensive disaster management plan. While the plan highlights detailed and effective measures against disasters, it is imperative that the policymakers go beyond and take into account the diversity of the conditions in the region. There is an urgent need to improve the response and rehabilitation measures in rural areas after natural disasters, as was evident after the earthquake in 2005 when remote villages were ignored, and most relief measures remained focused on towns and cities (Zahir-ud-Din, 2005). Early warning systems, which were not effective during the 2014 floods, need to be made functional for different types of disasters. The structural integrity of the existing infrastructure in the state needs to be improved with safety audit of existing buildings and strict adherence to earthquake resilience for construction of future infrastructure (Yousuf, Bukhari, Bhat et al., 2020). Social support among relatives, neighbors, and the community can also act as a source of resilience for people in the aftermath of disasters. A study done among adult survivors of 2014 floods in Kashmir region shows that high level of family and friends' support reduced the association between flood-exposure and symptoms of PTSD and depression to a great extent (Dar, Iqbal, Prakash, et al., 2018). There is also a need to engage with people and communities at the local level and formulate disaster management plans which makes use of the local and traditional knowledge systems. *Dhaji Diwari* is one such indigenous construction method which uses timber beams as means to reduce the impact of earthquakes on buildings. This method has been effective against earthquakes but is no longer widely practiced as people have moved toward more modern ways of construction using bricks and concrete which does not suit the unique landscape and climate of the region (Hassan, 2014; Yousuf, Bukhari, Bhat et al., 2020). Traditional and indigenous industries like handicraft need to be supported and private investment should be encouraged in industries such as biotechnology, mineral extraction, and leather goods (Mahapatra and Shekhawat, 2008).

In a disaster-affected area, while focusing on economic growth, it becomes imperative that the government pursues sustainable development which does not negatively affect the fragile natural environment of the region. Economic measures are important, but all economic activity such as investment, trade, and tourism depends, to an extent, on the security of the area. Over the years, the security situation in the region has improved substantially but remains fragile and prone to outbursts in the form of violent protests and terrorist attacks (Khan, 2017). There exists a trust deficit between the local population and the administration and this need to be bridged by more inclusive community engagement approaches. There is an urgent need to increase the social capital of the people of the region by making local communities' stakeholders in the functioning of the government. It can be done through decentralization of power and authority and through the implementation of developmental programs focused on the needs of the community, with their active participation. In addition, the recent bifurcation of the UTs and administrative policy change in the region has given government enough space to work on the safety, security, and economic development agenda of the region.

4. Conclusions

While our study has managed to present a comprehensive overview of the impacts of disasters on the lives of people in the region of J&K and Ladakh, it does have some limitations. The study is based entirely on available literature and no primary data were collected for it. In a dynamic situation like the one in J&K and Ladakh region, the study, while being true to the intrinsic nature of disasters, terrorism and violence, may fail to present the current situation. The study also leaves scope for in-depth research into the different impacts of the disasters highlighted here. Based on the findings, the study recommends the strengthening of effective disaster risk reduction and management systems, early warning systems and infrastructure – especially health facilities, schools and roads – in J&K and Ladakh region. In addition, emphasis must be laid on reducing the underlying vulnerabilities of the population through better community engagement approaches for both development initiatives and conflict resolution, with a special focus on the youth. Interventions made by the government to improve the resilience of communities should be implemented in a sustainable way, taking into account the risks posed by both natural disasters and terrorism. This study strongly recommends in-depth research and advocacy to ensure that resilience measures with regard to both natural and man-made disasters in the region are appropriately addressed.

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Authors' Contributions

Conceived and designed: Sangram Kishor Patel. Review of literature: Sangram Kishor Patel, Ankit Nanda, Govind Singh and Sunita Patel. Contributed to tools/materials/data collection: Sangram Kishor Patel and Ankit Nanda. Drafted and wrote the manuscript: Sangram Kishor Patel, Ankit Nanda, Govind Singh and Sunita Patel.

Conflicts of Interest

No conflicts of interest were reported by the authors.

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Not applicable.

Availability of Supporting Data

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