Assessing the Socio-Economic Implications of Natural Hazards on Development in Gilgit-Baltistan

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Abstract- The study aims to evaluate the socio-economic consequences of natural disasters in Gilgit-Baltistan, a region characterized by its vulnerability to various natural hazards such as floods, earthquakes, rock falls, avalanches, and landslides. The study area encompasses five districts in Gilgit-Baltistan: Gilgit, Diamer, Ghizer, Hunza, and Nager, which have all been affected by natural disasters in the past.

A quantitative, field-based exploratory study design was employed, with a sample size of 384 respondents. Data was collected through structured interviews utilizing a pre-designed and standardized interview schedule.

The results of the study demonstrate that the region is frequently impacted by seasonal flood disasters, leading to significant social and economic problems for the local population. This is evidenced by widespread damage to livestock, valuable property, and communication infrastructure, as well as disrupted social and economic development.

The findings of this study make a valuable contribution to the extant academic literature on the multifaceted impacts of natural disasters, particularly in vulnerable communities. The results highlight the imperative for implementing evidence-based disaster risk reduction measures to mitigate the vulnerabilities and enhance the resilience of these communities in the face of such events.

Keywords: Natural Hazards, Socio-economic implications, Gilgit-Baltistan, Vulnerable communities

1.INTRODUCTION

Natural disasters are sudden and violent events that have a massive effect on social and economic welfare [1]. Numerous studies have elucidated that a significant proportion of natural disasters can be attributed to intrinsic geophysical and atmospheric processes of our planet.

Natural disasters can be the result of environmental processes that lead to floods, droughts, earthquake and other environmental disturbances. Almost Empirical evidence indicates that approximately 75% of the global population resides in regions that have been impacted by natural disasters at least once [2]. These natural disasters are adversely affecting societies as well as economy of the country. According to comprehensive data spanning the period from 1970 to 2013, the global economy incurred economic losses exceeding $2.8 trillion due to natural disasters [3]. Empirical data reveal that during the time frame of 2000 to 2008, the mean estimate of economic costs associated with natural disasters amounted to $94 billion. In 2009, the estimated economic losses were estimated to range from $35 to $50 billion [4].

Natural disasters are unpredictable events with significant impacts on both the social and economic well-being of populations. Scientific evidence suggests that these disasters are a result of geological and environmental processes,

including floods, droughts, earthquakes, and other environmental disturbances. Approximately 75% of the global population resides in areas vulnerable to such events. In the period between 1970 and 2013, global economic losses due to natural disasters amounted to over $2.8 trillion [5]. In the period between 2000 and 2008, the average annual economic cost related to natural disasters was estimated to be $94 billion, with a reported estimate of losses between $35 billion and $50 billion in 2009.

Pakistan is widely recognized as being highly susceptible to a multitude of hazards, encompassing hydrological, meteorological, geophysical, and biological domains, such as floods, earthquakes, landslides, cyclones, avalanches, lake outbursts, droughts, pandemics, and epidemic diseases. Over the past five decades, the country has experienced a significant number of 162 natural catastrophes, leading to substantial loss of life and property, with an estimated value of $1.3 billion (Swathi, 2015 [6].

In Pakistan, disasters such as drought and floods have caused significant short-term reductions in GDP, with a 50 percent drop in growth during 1998-2001 and a $10 billion cost in 2010, which was equivalent to 5.7 percent of GDP. However, determining the impact of disasters on the medium and long-term economic outlook is challenging due to a lack of reliable data. From the available data from 2000-2013, it appears that on average, direct economic losses resulting from disasters constitute 1.16 percent of the national GDP, although this figure is skewed by the heavy losses caused by the 2005 earthquake and 2010 floods. Unfortunately, data collection infrastructure is inadequate for reporting losses from less severe disasters or those with a gradual onset.

The impact of disasters on the economy of Pakistan is two-fold. In the short-term, disasters such as drought and floods result in significant damage to both human and physical capital, leading to a reduction in GDP growth. For example, a prolonged drought in the period 1998-2001 led to a 50% decrease in GDP growth, while the floods in 2010 resulted in a direct cost of 10 billion dollars, which was equivalent to 5.7% of the country's GDP [7].

However, determining the medium and long-term impact of disasters on the economy is challenging due to a lack of reliable data. According to a study that analyzed EM-DAT disaster data (2000-2013) and World Bank population statistics for the same period, the average direct economic losses from disasters were found to be 1.16% of the national GDP. However, this data is biased due to the high losses incurred from the 2005 earthquake and the 2010 floods [8].

It is important to note that direct losses resulting from less intense disasters or those with slow onset are often not reported, as the infrastructure for data collection in these cases is inadequate [9].

This research study pertains to the Gilgit-Baltistan region, previously known as the Northern areas of Pakistan, encompassing a land area of 72,496 square kilometers [10]. Gilgit-Baltistan, located in a geopolitically significant area, shares its border with Southwest China and is home to three of the world's largest mountain ranges. The region is divided into three administrative divisions, namely Gilgit, Skardu, and Diamer, and further subdivided into ten districts, including Gilgit (the capital), Skardu, Diamer, Ghizar, Ghanche, Hunza, Nagir, Kharmang, Shiger, and Astore. However, the region is constantly exposed to various natural hazards such as floods, earthquakes, glacial movements, landslides, glacial lake outbursts, river erosions, avalanches, and rock falls, which pose a significant threat to its infrastructure, including buildings, roads, bridges, and water supply systems for agriculture and domestic use. Additionally, communication installations such as cables and towers, which are crucial for connectivity with the rest of the country and the world, including those of the Special Communication Organization (SCO), are also vulnerable to these hazards. Blockage of roads and communication sources keep the habitants of GB always deprived of food, livelihood needs, routine flow of business product supply because landslides disturb the supply chain sources from the down country. Moreover, they also take a toll in the form of human death and disability [11]. A hazard mapping survey of Gilgit-Baltistan, conducted by a non-government organization Focus humanitarian assistance,

indicated that nearly half of all houses in the region were at risk of multiple hazards [12].

Gilgit-Baltistan has experienced frequent occurrences of earthquakes, landslides, avalanches, and extreme floods in the past few decades. Notable events include the floods of 1980, 1994, 1996, 2010, and 2014. As per a report by Community World Service Asia in 2015, Skardu, Ghanche, Gilgit, Ghizar, Astore, and Hunza districts are highly susceptible to future flooding. A significant event took place in January 2010 when landslides blocked the Karakoram Highway and Hunza River. The magnitude of land sliding and rock falls was severe, resulting in the formation of an artificial lake that stretched for 25 km. This incident led to the flooding of five villages and caused extensive damage, including the complete destruction of a 25 km stretch of the Karakoram Highway [13].

Natural disasters can have multiple impacts on the local economy, including diminishing firm productivity by damaging productive assets, disrupting supply chains, generating unforeseen costs for consumers, or destroying housing infrastructure. The effects of these channels may result in varying relationships between the occurrence of disaster events and local wages, housing prices/rents, and net migration to the affected area [14].

II. METHDOLOGY

This study was conducted as an exploratory research to gain insights into the nature and impact of natural disasters in Gilgit-Baltistan. The scope of the study included households that have experienced the consequences of natural disasters. The population of the study consisted of households in the Gilgit-Baltistan region that were affected by natural disasters between 2010 and 2017. The sample was selected through convenience sampling, consisting of 11 villages from 5 districts that were severely impacted by the massive flood of 2010. Based on an estimated population of 134,244 that were affected by natural disasters during the study period, a sample size of 384 households was determined using a formula for sample size calculation. Data collection was carried out using a snowball sampling technique and a structured interview schedule. Univariate analysis was performed to analyze the data.

Table 1. *Details of damages/losses- Natural Disasters in Gilgit-Baltistan from 2010-2017*

Years	Deaths	Injured	House Damaged	Population Affected
2010	183		3538	100,000
2011			120	
2012	00	00	70	51
2013	00	00	14	
2014	13	35	1292	13266
2015	41	20	3502	
2016	25	24	493	
2017	08	08	171	

Source: National Disaster Management Authority (2010, 11, 12, 13, 14, 15, 16 ,17). Annual report

III. RESULTS AND DISCUSSION

Table-1: *Type of disasters that occurred*

Type of disaster	Frequency	Percentage
Landslide	33	8.60
Earthquake	55	14.32
Flood	265	69.01
Avalanche	20	5.20
Flash Flood	11	2.87
Total	384	100.00

In Gilgit-Baltistan, 69.01% of the respondents reported experiencing floods as the most prevalent natural disaster. 14.32% of the respondents had undergone an earthquake, while 8.60% reported being affected by landslides. A smaller percentage of 5.20% reported experiencing avalanches, and only 2.87% reported being affected by flash floods. It can be concluded that flooding is the most frequently occurring natural disaster in the region.

Table-2: *Damage to property due to disaster*

Property damage	Frequency	Percentage

Personal Home	89	23.18
Other Property	295	76.82
Total	384	100.00

The results indicate that a significant portion of the population, 76.82%, experienced damage to their property, which encompasses personal land, business premises, commercial structures, and hotels. On the other hand, 23.18%, of the respondents reported damage to their primary dwellings as a result of natural calamities.

Table-3: *Estimated cost of damaged property due to disaster*

Cost of property damage	Frequency	Percentage
Rs.10,000-50,000	0	0
Rs.51,000-90,000	44	11.46
Rs.91,000-1,30,000	126	32.18
Rs.1,31,000 Or Above	214	55.73
Total	384	100.00

The results indicated that a majority of respondents, 55.73%, experienced damage to their property with a value greater than or equal to PKR 1,31,000 as a result of a disaster. This was followed by 32.18% of respondents who reported damage to property valued between PKR 91,000 and PKR 1,30,000. The smallest percentage of respondents, 11.46%, reported losses to property valued between PKR 51,000 and PKR 90,000. These findings highlight the significant impact that disasters can have on people's property and the need for effective measures to mitigate such damages in the future.

Table-4*: Displaced Population due to Natural Disasters*

Migration	Frequency	Percentage
Rs.10,000-50,000	0	0
Rs.51,000-90,000	44	11.46
Rs.91,000-1,30,000	126	32.18
Rs.1,31,000 Or Above	214	55.73
Total	384	100.00

The table represents the data on the displaced population due to natural disasters in terms of their migration and compensation received. The data is divided into 4 categories based on the compensation received: Rs. 10,000-50,000, Rs. 51,000-90,000, Rs. 91,000-1,30,000, and Rs.1,31,000 or above.

According to the table, the majority of the displaced population (55.73%) received compensation of Rs.1,31,000 or above, while only 11.46% received compensation of Rs. 51,000-90,000. The least number of people (0%) received compensation of Rs. 10,000-50,000. The total number of people recorded in the data is 384.

This data highlights the disparities in the compensation received by the displaced population, with a majority receiving a higher amount of compensation and a small minority receiving a lower amount.

VI. DISCUSSION:

The region of Gilgit-Baltistan experienced an annually multiple natural hazards. Geographically, a large area of the region is covered by largest mountains. Mostly settlement of the region is exposed to multiple natural hazards like flood, avalanches, earth quack, Lack-outburst, land sliding etc. The region experienced Flood and avalanches on a regular seasonal basis. These calamities are significantly negative impacts on social and economic life of the inhabitants. The world suffered an over $2.8 trillion in economic losses between 1970 to 2013 by natural disasters. [15]. During the period from 2000 to 2008, the average estimate of economic costs associated with disasters amounted to

$94 billion. However, in 2009, the estimated losses attributed to disasters were in the range of $35 to $50 billion (The United Nations, 2010).

The Gilgit-Baltistan region is susceptible to various natural hazards including floods, avalanches, earthquakes, lake-outbursts, and landslides due to its mountainous terrain. These events have a significant impact on the social and economic well-being of the local population, with an estimated global economic loss of $2.8 trillion from 1970 to 2013 as a result of natural disasters (ESCAP, 2015). The average economic cost of disasters from 2000 to 2008 was estimated to be $94 billion, with a range of $35 to $50 billion in 2009 [16].

In addition to the information previously provided, it is important to note that the frequency and intensity of natural hazards in Gilgit-Baltistan have increased due to the changing climate and increasing vulnerability of the local communities. It is crucial for the relevant authorities to implement effective disaster risk reduction strategies and early warning systems to minimize the impact of these events on the population and infrastructure. This can be achieved through a combination of measures such as land use planning, hazard mapping, disaster preparedness and response planning, and community education and awareness. By implementing these measures, the region can better prepare for and mitigate the effects of natural hazards, ultimately leading to a more resilient and sustainable future

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