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Rural Livelihoods and Vulnerability Towards Natural Disasters: An Empirical Exploration from Selected Villages of District Gilgit, Pakistan

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Abstract: Present study explores livelihoods of rural households and their vulnerability towards natural hazards in three selected villages of district Gilgit, a far-flung mountainous area in north of Pakistan. Data were collected from 180 households by using purposive and snowball sampling techniques. Moreover, Livelihood Vulnerability Index (LVI) and descriptive statistics were used for data analysis. The standard value of LVI ranges from 0 to 1, whereby the higher value of LVI shows higher vulnerability. LVI for each village was calculated using the data of seven components i.e. socio demography, livelihood strategies, social networks, food, health and education, water, natural disasters and climate vulnerability. The results suggest that the rural households of district Gilgit are vulnerable to natural disasters and Gilgit is most vulnerable in food and social network and least vulnerable in terms of demographic profile. Lastly, the overall value of LVI for district Gilgit is 0.34

Keywords: Rural livelihoods, vulnerability, natural disasters, Gilgit, LVI.

Introduction

Livelihood is an essential part of economic arrangements of households. Livelihood refers to the accessibility of an individual or family to basic needs of life such as sufficient food, water, clothing and shelter. In other words, livelihood encompasses all the basic means of living for a household. It consists of people's assets, income, capabilities and activities used to secure the necessities of life (Ellis, 1999). Livelihood may be negatively impacted by anomalies or shocks in terms of climate, agriculture, economy, society, politics etc. Poor and deprived people suffer the most in such circumstances because of their limitation to deal with these shocks. According to Shaw et al. (2006), if a person or a society is incapable to cope with the disasters and unable to recover from a shock, such a person or society is termed vulnerable.

Vulnerability is a term which is generally used to describe poor quality of social, political and economic lives of the people. It describes those people who are facing hurdles to access the basic needs of life. These are very deprived people who are unable to cope with the shocks and have no or very limited social, political and economic rights (Gurung and Kollmair, 2007). According to Gibson (2006) rural households have more chances to be vulnerable to social, economic and weather shocks. These shocks can hamper development of the poor people and it becomes very difficult for them to come out of poverty. It is a very challenging and long-term job to improve the living standard of the deprived people. Vulnerability is a pressing issue in urban slums and rural areas all over the world. Developing as well as developed countries face this problem. Since the living condition is generally poor in urban slums and rural areas of developing countries, people in these areas are very deprived and face lot of problems (Akhtar and Basher, 2014).

Pakistan is also facing the problem of vulnerability specially in rural settings where livelihood is fragile because of dependence on natural forces. In Pakistan, almost 70% of population lives in rural areas (Shera, Jawad and Maqsood, 2007). The livelihood in rural areas is worse, whereby people face severe shortage of food because they are only producing goods for their subsistence due to limited cultivated land and lack of specialization. Farrington et al., (2002) found that vulnerability tends to be high in rural areas as compared to urban areas.

Majority of the population of Gilgit-Baltistan is poor and deprived, especially the rural households. People in these areas have limited access to basic necessities of life and are more vulnerable to shocks. On the other hand, less attention has been paid to this area by the government and private sector. From an academic standpoint, limited research has been conducted about rural livelihoods and vulnerability of households to various shocks. Present study is an attempt to understand the nuances of vulnerability juxtaposing natural disasters as one of the major threats to the life and livelihood of dwellers in these rugged mountain areas of Gilgit-Baltistan. The findings of this study will potentially help the government and other organizations to formulate better policies for improving livelihoods and family lives in Gilgit district.

Materials and Methods

This study covers some important components like socio-demographic profile, social network, health and

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education, food, water, housing and land. These main components further consist of many sub-components. For example, the first main component i.e. socio demographic consists of household dependency ratio, female headed households, age of the household head, education of household head and household members who need special care. The second main component is livelihood strategies which include household income, household members who work outside the community, household agriculture income, fishing, hunting, income from forest, non-agricultural livelihood income contribution etc.

Likewise, the third main component is social network which includes receiving and extending help to another household, borrowing and lending of rural household and government support. The fourth component is health profile which includes sub-components like health facilities, households with members suffering from chronic illness, household members who missed work or school due to illness. The fifth component is food profile that includes sub-components like household's dependency on food, food from their own farms or outside purchases and self-reliance. Moreover, water profile is the sixth main component that includes sub components like households without tap water, households utilizing natural water system, number of days during which water is not available, average number of days, households store water. Lastly, natural disasters and climate variability consist of many subcomponents like average number of floods in last three years, households that lost their assets due to floods, household members who faced injuries or even death from natural disasters, their coping strategies during shocks and afterwards. The present study area comprises three villages i.e. Bagrot, Oshkhandas and Bargo of Gilgit city (Fig. 1). Semi-structure questionnaire was used for data collection. A total of 180 questionnaires were administered (60 in each village) to collect the data.

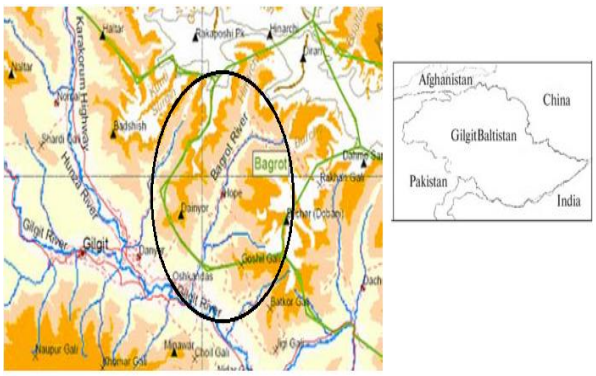

Fig. 1 Map of the study area. Source: Melisa et al. (2008)

The questionnaire was based on seven components critical to vulnerability of households in each village. Non-probability sampling technique was used whereby purposive and snowball sampling methods were applied, and finally SPSS and Microsoft excel were used for data analysis.

Livelihood Vulnerability Index (LIV)

This study used Livelihood Vulnerability Index (LVI) for data analysis. The LVI of Hahn et al., (2009) is a composite index comprising of seven major components i.e. socio demographic profile, livelihood strategies, social networks, food, health and education, water, and lastly natural disasters and climate vulnerability. LVI as a framework is more relevant and reliable to calculate vulnerability which helps in calculating the overall vulnerability of a village and different components in each village. Each main component further consists of some sub components which provide enough insight to gauge the vulnerability of a village. The main stage here is to calculate the vulnerability of sub components. Based on the calculation of sub components, calculations for main components become easy. First of all, the sub components are calculated according to their respective units like averages, percentages and ratios. The values of these sub-components are used in the index formula to find out the vulnerability index value of each sub component.

The formula for calculating the vulnerability index value of sub component by UNDP (2007) is

$$\textbf{\textit{Index}}\ \text{s.c} = \frac{S_c - S_{min}}{S_{max} - S_{min}} \quad \text{---------- (1)}$$

Here *index* s.c stands for vulnerability index value of sub component, S_c is the actual value of sub-component from Table 4, S_{mix} and S_{min} are the maximum and minimum values for each sub-component. Once the vulnerability index values for the entire sub components are calculated, then by using these sub-components, the main components are calculated. The value of main components is obtained by averaging the values of its all sub components as per equation (2)

$$\textbf{\textit{Index}}\ \text{m.c} = \frac{\sum indexs.c}{n} \quad \text{---------- (2)}$$

Here the '*index* m.c' is the value of vulnerability index for main component. While the *index* s.c is vulnerability index value of sub component, 'n' is the number of sub components in each main component.
The first main component is demographic profile which includes the following sub components; dependency ratio, percentage of female headed household, average age of family head and percentage of illiterate household heads. The main component is calculated by averaging the values of sub components.
In sum, all the seven main components are calculated with the help of their respective sub components, and the average value of the seven main components gives the vulnerability index value of a single village.

The formula for calculating the vulnerability of a village by using seven main components is given as:

$$LVI.v = \frac{\sum index m.c}{7} \quad \text{---------- (3)}$$

Here the LVI.v is the livelihood vulnerability index value of a single village. While the '$\sum index$ m.c' is sum of vulnerability of seven main components and 7 is the number of total main components. Similarly, the livelihood vulnerability index values for other two villages have been calculated. Lastly, the LVI for Gilgit is calculated by using the values of given three villages.

Results and Discussion

A brief descriptive statistic summarizes the effects of shocks in rural areas of district Gilgit (Table 1) which shows the average shocks per year, amount of loss of a household in recent natural disaster, average loss of agriculture and time needed to recover from a shock. The average shocks in rural areas of district Gilgit are 1.59 per year which is a dreadful situation for Gilgit. Börner et al. (2014) found that the average shocks in some areas of Asian countries are 1.06 per year. In Gilgit-Baltistan these shocks occur frequently as compared to other provinces of Pakistan, and people suffer severely by losing their lives and livelihood. The average loss of a household in rural areas of district Gilgit in the last shock is Pak rupees 215502.25.

Table 1. Descriptive Statistics.

	N	Mean	Std. Deviation
Average shocks per year (No.)	180	1.59	.675
Loss in recent shocks (PKR)	180	216983.33	315502.25
Average loss of agriculture (PKR)	180	59155.56	47348.916
Time needed to recover from a shock (months)	180	23.44	15.26

Similarly, the average agriculture loss of a household is 59155.56 PKR which is not massive as compared to the loss of shocks in other countries of the world. Arouri, et al., (2015) found that the average loss during a shock in rural Vietnam is USD 2500 and the time needed to recover from a shock in rural Vietnam is 8 to 10 months. Moreover, results show that average time needed to recover from a shock in rural areas of district Gilgit is 23.44 months. These shocks also affect the household's income and consumption.

Table 2 shows the frequencies of decrease of income and consumption due to natural disaster. According to Cannon et al., (2016) the natural disasters cause a decrease in income and consumption of households. In some exceptional cases households reported that their consumption increases during the shocks. Table 2 shows that income of 148 households has decreased due to shocks but the income of 32 households has not been affected by these shocks. Natural disasters disturb livelihood sources, activities of the people and also damage the land and crops (Wietzke, 2015). In this way most of households suffer, while experiencing a decline in income and consumption. This study also showed that about 72% household's consumption decreased due to the shocks, while the consumption of 28% households did not decrease due to shocks.

Table 2. Frequencies of Income and Consumption

		Frequency	Percent
Is level income decreases due to natural disasters?	Yes.	148	82.2
	No.	32	17.8
	Total	180	100.0
Is level of consumption decreases due to natural disasters?	Yes.	130	72.2
	No.	50	27.8
	Total	180	100.0

Likewise, the study area lacks health facilities whereby people face many problems related to health (Table 3). The results depict that out of 180 households, 160 (88.9%) have access to health facility in their villages. In addition, 115 households received health facility while remaining 65 i.e. 36 % households did not receive any health facility from government hospital. The findings revealed that out of 180 households, 146 cannot go to work/school due to illness. Similarly, 50 respondents were chronically ill (Table 3).

Table 3 Health effects

		Frequency	Percentage
Is health facility available in your village?	Yes	160	88.9
	No	20	11.1
	Total	180	100.0
Do you receive health facility from Government?	Yes	115	63.9
	No	65	36.1
	Total	180	100.0
Any member missed work or school due to illness?	Yes	146	81.1
	No	34	18.9
	Total	180	100.0
Is any member chronically ill?	Yes	50	27.8
	No	130	72.2

Cavallo and Noy (2010) also found that 22% of the population does not receive health facilities from government in developing countries of Asia.

Livelihood Vulnerability Index (LV)

After finding the vulnerability index values of all the seven major components, these values were further summarized into a single value by taking the averages

of all these components of each village. In this way the vulnerability index value for each village was calculated. For example, the vulnerability index value for Bagrot is calculated as;

$$\frac{0.14+0.34+0.19+0.07+0.23+0.17+0.32}{7} = 0.21.$$

Moreover, the vulnerability index value for Oshkhandas is 0.34, and for Bargo it is 0.47. Greater the value of LVI greater will be the vulnerability. The vulnerability index value ranges from 0 to 1. Table 4 shows the vulnerability index values of major components for Bagrot, Oshkhandas and Bargo. Results revealed that Bargo village is more vulnerable as compared to other villages. It has highest i.e. 0.47 value among other villages. On the other hand, *Bagrot* village is least vulnerable among three villages of the study area.

Table 4. Vulnerability index values of major components.

Major components	Bagrot	Oshkhandas	Bargo	Values for District Gilgit
Socio demographic profile	0.14	0.25	0.25	0.21
Livelihood strategies	0.34	0.32	0.37	0.35
Social networks	0.19	0.42	0.77	0.46
Health and Education	0.07	0.34	0.40	0.27
Food	0.23	0.45	0.60	0.43
Water	0.17	0.23	0.48	0.29
Natural disasters and climate variability	0.32	0.35	0.42	0.36
Vulnerability of Bagrot, Oshkhand as and Bargo	0.21	0.34	0.47	0.34

Conclusion

It is concluded that Bargo village is more vulnerable in all the seven components as compared to other two villages. However, Bagrot village is least vulnerable in six components. Lastly, the overall value of LVI for district Gilgit is 0.24.

In the natural disasters, the first respondents are the communities living in the disaster's prone areas therefore, community should have resilience to counter and respond to the disaster. Thus, awareness about disaster hit and its consequences should be communicated to the community by the institutions working under the disaster management. Moreover, the study suggests that government should take serious precautionary steps to minimize the damage of natural hazards to the life and livelihood of rural households. This can be done by making early warning systems in place, raising awareness about hazards, ensuring mitigation and prevention and also investing more on activities related to disaster risk reduction.

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