IMPACTS OF FLOODS ON THE SOCIO-ECONOMIC LIVELIHOOD OF PEOPLE OF PAKISTAN: A CASE STUDY OF MIANWALI DISTRICT OF PUNJAB

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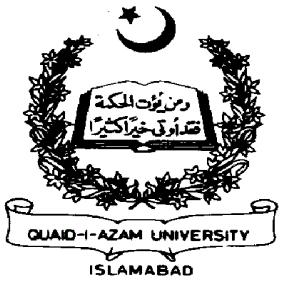
A thesis submitted in partial fulfillment of the requirements for the Degree of

Master of Philosophy

In

PAKISTAN STUDIES



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DEDICATED

TO

MY BELOVED PARENTS, SIBLINGS AND FRIENDS.

TEACHER DECLARATION

I hereby recommended that the thesis prepared under my supervision by Narmeen Khan Titled:

"Impacts of Floods on the Socio-economic Livelihood of People of Pakistan: A Case Study of Mianwali District of Punjab"

Be accepted in partial fulfillment of the requirements for the degree of Master of Philosophy in Pakistan Studies

Dr. Manzoor Ali Veesrio

Supervisor

Student Declaration

The material and information contained in this thesis is my original work. I have not previously presented any part of this work elsewhere for any other degree.

Name of Student
NARMEEN KHAN

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Abstract

Floods is the most destructive natural hazard in Pakistan and the recent floods from 2010 has proved its severeness. The present study is explores the effects of floods on socio-economic livelihoods of the people of affected areas of Mianwali. Both quantitative and qualitative research methods were used to find out the impacts of floods. The study documented that how floods impacted on the socio-economic livelihoods of the people and also other aspects like cultivation, housing, property and assets, water and sanitation, health, and education. The main objectives of the investigation are to explore the situation, history, causes of floods, degree and effects of the flooding.

In the study area, floods are recurrent phenomenon and from the repeated floods in last few years have some destructive impact. These floods were unique as the floods were primarily due to the heavy rainfall in the whole of Pakistan. The floods damaged the infrastructures like houses, health, educational institutes, etc. and also agriculture land, standing crops, and livestock. Floods caused trouble in movement, risk for living at houses intensified, fear, trauma, and destruction of social networks such as brotherhood, neighborhood, etc. Similarly, destruction of food stocks and water borne diseases in humans also in animals. Floods forecasting, floods early warning system and flood management save many lives and assets.

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LIST OF ACRONYMS

IPCC	: Intergovernmental Panel on Climate Change
ESCAP	: Economic and Social Commission for Asia and the Pacific
UN	: United Nations
WMO	: World Meteorological Organization
UNDRO	: United Nations Disaster Relief Organization
UNDP	: United Nations Development Program
UNISDR	: United Nations International Strategy for Disaster Reduction
CRED	: Centre for Research on the Epidemiology of Disasters
EM-DAT	: Emergency Events Database
PDMA	: Provisional Disaster Management Authority
KPK	: Khabar PakhtunKhwa
NDMA	: National Disaster Management Authority
UNICEF	: United Nations Children's Fund

Chapter 1

Introduction

World disaster statistics reflect that an increase in the disaster pattern, ranging from natural events such as cyclones, floods and earthquakes, to disasters caused by human ('manmade') such as roads and other accidents, oil spill over, infrastructure damages and large-scale population dislocation due to conflict (Lerner-Lam, 2007). The impact of such disasters on the populations and the material losses is not at all similar. Over 95% of all deadly disaster happened in developing countries. Losses due to natural disasters are twenty times greater in the developing countries than those in any industrialized state. This differential impact depicts that disasters should not be considered as isolated events at all: they are most likely connected to the physical, social, political and economic milieu in which they occur (IFRC, 2001). Specifically, the chances of a disaster happening and the impact of a disaster depend on exposure to hazards and vulnerability of populations.

Flooding world-wide is accompanied by losses and related human health impacts. Flooding is a temporary layering of water on land that may be caused by high rainfall. Flood hazards are the most common and harsh of all naturally occurring disasters. Flood is a global phenomenon affecting rich and poor, the prepared and unprepared alike (Kron, 2002). Heavy rainfall in the river catchments and snow melting, generally result into floods in rivers during the monsoon season (Uddin, 2013). The major causes of flood disasters include the combining effect of land inundation from heavy rainfall, climate change, and blockage of drainages with refuse, construction of buildings across drainages, inadequate drainage networks, and population increase in urban areas.

These factors independently do not cause floods but the combination of several of these usually cause flood disaster. Construction on natural drainages, increase in the population, and conversion of natural vegetation, agricultural land, and wetlands due to urbanization threaten the lives of people living in flood vulnerable areas such as flood plains and river beds (Adeoye, 2009). All over the world, it is acknowledged that floods are the most serious natural hazards and spoil lives and property. Floods are causing vast socio-economic damages in the South Asian countries in the last few decades (Ahmed, 2011). Flood problem has been reported almost everywhere in the world with much more pronounced effects in the developing countries (Alcantara. 2002).

In different region of the world floods become as a regular part of the lives of people, repeatedly occur with different frequencies and degree, to which people adapted for the centuries. In many parts of the world these floods are normally welcomed and expected, because they enhance the soil potential and provide water that is necessary for agriculture and livelihoods. Typically, flood means a surplus of water that submerging of ground, low-lying rural and urban cities or an odd form affected by the flood (Rahman, 2014).

Floods may happen due to heavy rainfall, water overflow from water bodies, as such river, cannels or lake, or ocean or natural water basin, or may occur due to gathering of rain water on saturated land. In disparity, floods occurring due to severe hydrological and meteorological occasions and cause loss of livelihoods, living, and transportation and also damage the atmosphere (World Meteorological Organization (WMO), 2013).

Normally, it was evaluated that extensive flood is the most natural hazard causing wide range damage to natural environment, and destruction to human settlements. Around the globe due to the effects of destructive floods economic losses have drastically increased (Ahmad, 2005).

Over the years, regularity of natural disasters has been rising, resulting in loss of life, physical property and damage to environment (Asian Disaster Preparedness Center, 2005).

Apart from this, the effect of severe floods is dramatic in many cases, not only at individual level, but also as a whole in the country (Demir et al., 2013). Intergovernmental Panel on Climate Change (IPCC) on its Fourth Assessment Report 2007 shows that heavy rainfall, which is likely to intensify in frequency, will enhance flood risk (IPCC, 2007). In Asian countries, Pakistan is one of the country that is at risk and exposed to several hazards, due to both natural and man-induced activities. The range of natural hazards impacting Pakistan just because of the high variability of the country in terms of geology, landscape, and meteorology (Larsen, Oliver, & Lanuza, 2014).

Pakistan is fundamentally an arid country as its ninety two 92% of total area located under semi to hyper arid area. Hence out of eighty 80 million hectares, seventy four 74 million hectares are located under arid atmosphere. In Pakistan that during the planting season the cash crops such like rice, sugarcane, and cotton were affected by the flood. Rabbi and Kharif two cropping season in Pakistan. The planting season in Kharif begins from April to June and during October to December crops harvested, while in October to December Rabi season started and in April to May crops 9arvested. Major crops of Kharif are cotton, maize , rice, sugarcane, jawar, mash and bajara and Rabi crops are tobacco, lentil (masoor), rapeseed, barley, wheat, mustard, and gram (Crops & Crops, 2010). In term of Pakistan's agriculture its 68000 miles square land laying under the area where average rainfall is less than thirty millimeters 300mm per year (M. Ahmad & Ahmad, 2004).

Summer floods are common in Pakistan but 2010's flood in Pakistan is the century's worst one. The monsoon rain is not disastrous every year. Pakistan is an agricultural country and the economy is mostly agrarian. About 70 to 80 percent of the population depends on

agriculture, contributing about 30 percent to country Gross Domestic Product (Muhammad, 2013). Generally part of Pakistan economy and particularly water availability to crops are highly dependent on monsoon yearly rain. But 2010's flood was most destructive that all the previous records of the amount of rainfall, discharge, and damage to property and life have been broken by the 2010's flood (Khan, 2013).

1.1 Problem of Statement

The 2010 floods provide a natural experiment in which to study the impact and aftermath of the floods in one of the most adversely affected districts, Mianwali District in Punjab Province. Floods are an undeniable reality and are the most devastating and destructive among the natural disasters and brought huge losses and damages. There is a remarkable rise in the frequency of floods all over the world. This has caused a loss of human lives, damage to physical properties, infrastructure and also environmental degradation. The population has been severely exposed who reside in low-lying areas, close to rivers and also high rainfall vulnerable areas. Low living standards have also intensified the vulnerability of many local societies in rural areas. Floods in Pakistan from 2010 due to huge monsoon rainfall has enhanced the various concerns with respect to floods and vulnerability. This study assesses the extent of flood vulnerability and adaptation in Mianwali district of Punjab Province, which have been affected by the flood hazard repeatedly in recent years. The problem which this study addressed is the impact of floods on the social and economic life of people in Mainwali.

Furthermore, the study also examines the strategies that the affected population used to reduce the negative impact on people and agricultural production. The floods caused some significant effects on the of economic of the country and also losses of human lives. So, the study

carried out in the floods affected area and try to find out the most obvious effects of floods on the people and socio-economic livelihoods sectors.

1.2 Research Questions

The study deals with following research questions.

1.2.1 Main Question

1. What are the impacts of monsoonal floods in District Mianwali and how floods affects the social and economic set-up in respective district?

1.2.2 Sub Questions

1. What are the main causes of frequent floods in the district Mianwali?
2. What are the strategies employed by the residents to cope with this natural calamity?

1.3 Conceptual Framework

1.3.1 Vulnerability

Vulnerability is the situation of an individual or society and property or environment, when it comes to their ability and potential to be able to assume, deal with, respond and recover from the effect of natural hazard e.g. flood. As an example; people with disabilities, children and old people might possibly be more vulnerable and less able to move out during flood events as compared to young people. There are many methods to understand the term "vulnerability". Better understanding of "vulnerability" can be helpful in accessing and reducing it. According to Blaikie et al, (1994) vulnerability is the "characteristics of a person or group in terms of their capacity to anticipate, cope with, resist and recover from the impact of natural hazards". They also argue that

household that has access to resources and social networks are less vulnerable than the household who does not have access to resources and social network.

Vulnerability measures resistance against the shock, and the possibility that a shock will result in a decline in well-being. Vulnerability primarily a function of a household's assets, grants and exchange, insurance mechanisms, and the true features (severity, frequency) of the shocks. If the household has small income this means that they are less able to save and gather assets, which ultimately limit the capacity to deal with a crisis. Households mitigate risk through income variation, from wage income, self-employed income, investments in physical and human capital (Pryer, 2000).

Vulnerability and the degree of ability of an individual or household to recover from shocks are connected with the resources or possessions that people holds, so the relationships between vulnerability, assets and poverty are important to understand. Vulnerability is not an identical with poverty but means helplessness, insecurity, and exposure to risk, shocks and stress. It is linked with assets such as human investment in health and education, and also productive assets such as houses, domestic equipment, access to community infrastructure, stores of money, jewellery and gold and claims on other household, investor, governments and the international community for resources at times of need (Pryer, 2000).

The access to resources is permanently depend on social and economic relations, including social relation of production gender, ethnicity, status and age, it differs greatly between individual and groups and this affects their relative resilience to disaster. Those with better access to statistics, money, and means of production, equipment and social network are less vulnerable and are generally able to recover quickly, crisis and insecure conditions put the life of people into more risk and vulnerability so, each household may have experience to different type and nature of risks

depending upon their livelihood strategies, and their resources (Blaikie, et.al. 1994). Some households structure their income opportunities in such a way as to avert the risk of threatening events such as flood. They also employ survival strategies and coping Mechanisms once that event has occurred, though this usually involves an element of physical or institutional preparation.

A household is in a vulnerable state if there is a high probability of suffering loss or damage to life or property from which there is a high probability of it not recovering quickly or fully because the effect are either lasting or opportunities of recovering losses are insignificant. Poor people have to depend on largely on self-insurance. Household protect themselves by collecting assets in ordinary times and then drawing on them in bad times. So the household who does not have any assets are vulnerable, so such household rely on mutual support network of members of a community or extended household, among members of same occupation. When a shock occurs the poor household must needs instant increases in income or cut expenditure, but in doing this they incur a high long-term cost by threatening their economic and human development prospects. These are situations that lead to child-labor and starvations, with lasting damage to children and breakdown of families.

The poorest people have fewest assets, so in general the poorest households reach the threshold of collapse much faster than other (Chambers,1995). Sen, (1987) discuss the vulnerability of people involved in informal serviced sector or landless laborer, in the Asian context. Such group of people don't have the opportunity to undertake second stage coping strategies of selling assets nor have they opportunities to make short term adjustment to livelihoods such as changing cropping pattern. (Adger, 1996).

Vulnerability in the view of Gheorghe (2005) is the function of susceptibility, resilience and state of knowledge. Few (2003) argued that in developing countries poverty and vulnerability

to environmental hazards are closely related with each other. Few (2003) states that low income peoples migrants, and those people living in inferior houses often in slums areas are the most vulnerable. The poor people suffer more from hazards as compared with the rich people. Due to fewer resources, poor people are unable to spend money on precautionary measures, emergency supplies, and recovery efforts (Cutter et al., 2009). In terms of material and economic, loss may be greater in wealthy urbanized areas.

1.3.2 Flood Vulnerability

In addition, in less developed countries the rapid population growth and density, illiteracy, unemployment and traditional agriculture economy maximize the vulnerability to floods. Flooding is a natural phenomenon occurring around the world, but the effects on the societies are different from one location to another and event as well. Adjusted normal perception around the adverse impacts regarding inundating is just not often pertinent in each and every overflow. Flood brings number of economic and environmental benefits with itself (Blaikie et al., 1994). According to Few (2003) floods can flush out salts and toxin from soil, fertilize and irrigate fields and refill the water reservoirs (Few, 2003). The severe impacts of floods depend on the vulnerability of the population and activities, intensity, frequency and level of flooding (Khan, 2013). Due to the negative impacts of flooding, millions of people are affected; thousands are in need of medicine, food and shelter. Some of the negative impacts of floods are loss of lives and property, loss of livelihoods, political implications and economic growth and development.

The instant impacts of flooding contain loss of individuals and lives stock, damages to property and infrastructure. Loss of lives is even higher due to flash floods in case of little or no warning system compared with the deaths caused by slow rising riverine floods (Khan, 2013). As due to floods infrastructure and communication links, roads, bridges and power stations damaged

and run-down, turn out the dys-function of daily life for a period (Khan, 2013). A study by Chambers (1995) states that, “after each flood, the same families tend to lose their homes, possessions and livelihoods, increasing their vulnerability to the next disaster event”.

After the floods due to the ineffective response in the recovery process from the government may lead to public discontent and fretfulness situations over the authorities (Mandel, 2002). Lack of proper development process in the flood stricken areas may cause social disparity and desperation posing threat to the region peace and stability (Khan, 2013).

The floods will have negative impacts on economic growth and development (Nguyen, 2007). The high cost of recovery and relief activities may adversely affect the developing countries‟ economies and divert developmental funds to reconstruction process and may hinder the economic growth and development (Khan, 2013).

The majority of vulnerability definitions are within the context of a failure of an exposed system to adapt and to cope with a floods hazard. Therefore, the failure of any system to the response against the hazards has increased the vulnerability, while resilience of exposed system limits the vulnerability. The vulnerability of floods can be specified in terms of relationships between predicted damages about all elements at risk and the vulnerability and exposure features of the affected system, referring to the possible flood hazards (Scheuer, Haase, & Meyer, 2011).

There are three factors of vulnerability are expressed within the context of flood vulnerability. These factors are exposure, resilience, and susceptibility; as economic, social, physical and environmental four associated components of floods. According to Scheuer et al. (2010), the more vulnerable system is the more at risk. Flood vulnerability is more concerned with

the materials that are in a specific area, especially the losses and damages that can be caused by the system due to floods (Scheuer et al., 2011).

Many natural features like environment, physical setting, landscape, types of soil, and land cover are influenced by floods. However, man-made activities may raise the potential floods impacts through, growth in population at a high rate, in flood-prone areas huge human settlements, alteration in land cover and use, and insufficient progress of flood control drainage. It clearly shows that both human and natural based aspects are responsible for occurring of floods.

The risk of natural hazards may be depending on the different elements. The exposure degree of diverse elements in hazard-prone areas and vulnerability of that area. This means, if with the occurrence of any natural hazards no human being or any physical property affected than there is no socio-economic risk of that hazard. Crichton (1999) further explain this concept of risk as the hazard, vulnerability and exposure are the three elements on which the possibility of a loss depends on (Crichton, 1999). Kron (2003) defined the risk of flood as, it is one function of flood hazard, the elements that exposed and also their vulnerability (Taubenböck et al., 2011). In this respect, International Penal on Climate Change (2012) claimed that many researchers to explain the risk as a result of hazard, exposure, and vulnerability and also considered it a convenient way to express risk hazard (Field et al, 2012). According to the International Panel on Climate Change (2007), vulnerability means the degree to at extents a community is exposed to climate change, and incapable to deal with the hostile impacts. (IPCC, 2007)

When heavy rainfall occurred and this lead to the flood it becomes disaster only when the coping capacity is low then the impacts of the flood. Moreover, floods may impact several features of human security elsewhere directly effects on physical damages and interruption of social and economic activities. Floods by threatening the livelihoods patterns impacts on the individual as

well as community security. Furthermore, floods impact on health by creating many health issues and problems like mental and physical health, malnourishment, malaria and during floods many diseases outbreak for instance diarrhea and cholera. Most importantly, floods hugely affect the agricultural production and yields by destroying cultivated lands and standing crops. By the destruction of agriculture of any country, it destroyed the economic and financial system and market also, damages of food crops it creates food insecurity in the country and sometimes famine occur, along with this environmental and ecosystem also disturbed. This means that the floods damage all features of human security. Thus, the floods risks may be decrease and human security may also be improved by existing exposure, hazard, or vulnerability of human and community reduced. On the other hand, if undertake any activities and actions for a decrease in human insecurity it may also reduce exposure and vulnerability.

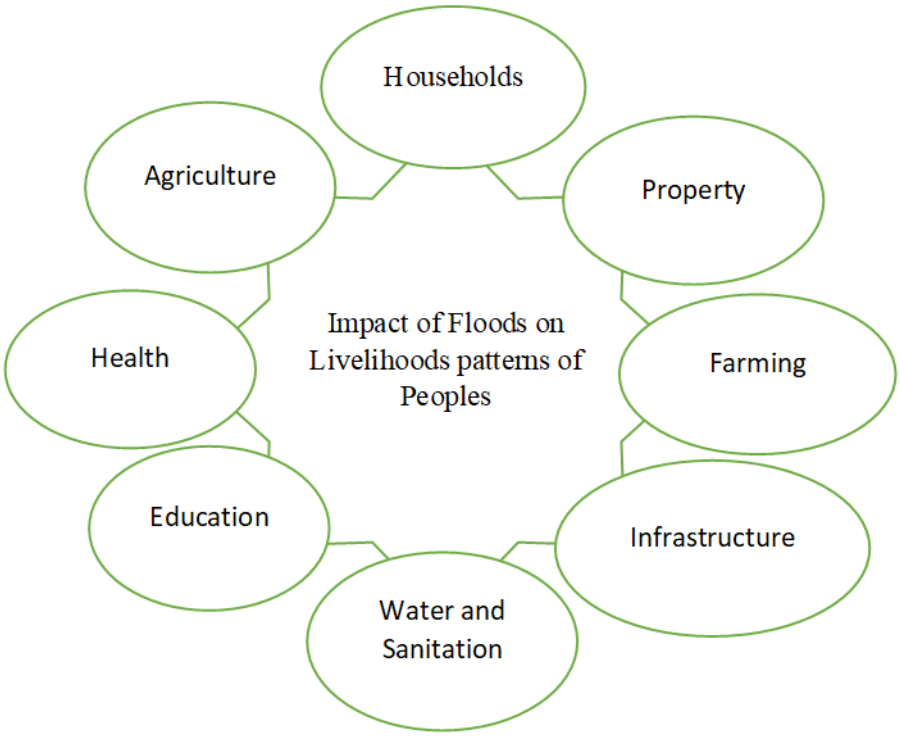

Figure 1.1: Conceptual framework of this study

Sourse: Made by Author

1.4 Methodology

This study was carried out in the selected area of Mianwali district. In this study, the key information was attained by directly talking to the particular people at the household level and the researcher gets very accurate and correct data. For this study, started a collection of data and information from household by the mean of self-developed semi-structured interview Questionnaire. The purpose of selecting the semi-structured interview is that its included both closed and open-ended questions and participants allow openly share information, their feelings, the experiences during specific phenomena and exploratory data is gathered. The questionnaire contained the following things: Household demographics, Livelihood Patterns, Flood Impact on: Agriculture, Health, Livestock, Infrastructure, Education, Water and Sanitation, Housing and Property.

Recording, note taking and observation methods were used for the collection of information and data about floods influences on their livelihood. Most importantly every person who participate in this study their consent was obtained. The researcher acknowledged every member about the confidential and moral issues and also the participants refuses to response any question and they also withdraw from any part of the investigation and all data and information that collected only used for the study purpose not for any other and it was secure and protected.

In this research dependent variables are various livelihood resources like houses, livestock, land and property etc. Observation and interview of member of household was utilized for collection of data and information from participants and the interview was primarily focused on the impacts of flooding on livelihood resources of the affected people.

In this study the flooding and its effects are the independent variables. All participants of this study reported the flooding state at the affected area as well as the chief effects. The respondent also asked for any massive disturbances due to the flooding and the subordinate impacts of that flooding. To collection of data for this study the researcher developed semi-structural self-developed questionnaire. In the questionnaire researcher included some kinds of short answer were at that question and for collection of data from sample population also chooses some criteria but people have freedom to share every experience and views about the situation. In this study the people were included who effected due to the flooding and related issues of flooding. In this the one of the most significant aspect is age level of the sample population and the age of the participants from 21 to above was considered.

Secondary information and data were gathered from the organizational reports such as water department reports, agriculture department reports, NDMA reports, PDMA reports, census report, and many articles on this issue. For primary data, the participant interview was conducted with one hundred and ten household. For a productive data and informative data, this study used individual experience, opinions, view, and thoughts to achieve the purposes and objectives during the interview. After the primary data collection from the selected study area, all information and data are observed for the discussion and result.

Sampling can be defined as taking any section of a population as demonstrative of that population and the main purpose of sampling is a possibility. It is impossible of total coverage of the whole population and the interest of all the people of the population cannot probably be reached. As if it is possible to recognize, interact and study the whole related population theoretically but due to some limitations like time duration and cost generally, make it a difficult task. The practice of samples may produce more exact data than the data have been obtained from

the study of the whole population because, with a sampling, time duration, cost consideration and effort can be focused only on to produce good quality and valued research.

The targeted population, for this study, is households, and key informants. In this study, use random sampling and then Purposive sampling employed. According to Strydom, Fouche and Delport, (2005), purposive sampling is entirely based on the judgment of the researcher, in that a sample is composed of elements that contain the most characteristics, representative or typical attributes of the population. Because of less time duration and monetary resource, 0ne hundred and ten (110) households were sampled and interviewed from the population. At community and district levels total of five participants were interviewed as a key informant.

1.5 Significance of the Study

This study is significant in three ways. First, it has surveyed effects of the floods on the people's social and economic livelihood patterns. The floods provide a natural experiment in which to study the impact of the floods in one of the most adversely affected districts, Mianwali District in Punjab Province. Secondly, it has found out the basic causes of floods and its vulnerable areas in the district. In addition to the consequences of floods identified, another value of this study is that it demonstrates how available population information and geographical data can be used to envision flood events and map the population at risk to produce a full picture of the medium-and long-term impact of floods, as well as the vulnerability and adaptive responses of affected populations. Thirdly, this study is a pioneer work that results of it may help the district administration in designing measures to reduce the impact and risks of frequent floods in the region. In addition, this approach highlights that climatic and demographic processes are dynamic and linked, and the understanding of these interactions is critical to inform strategies aimed at managing future risks. This study is intended to expand the discussion on floods adaptation in and elsewhere, and to

highlight the need for including a demographic lens through which a more comprehensive understanding of the potential impacts of devastating flood events can be achieved.

1.6 Objectives of the Study

1.6.1 Main objective

1. The main objective of this study is to find out the floods impacts on the socio-economic life of people of District Mianwali.

1.6.2 Sub objectives

1. To find out and examine the fundamental causes of vulnerable groups.
2. To find out strategies that have been employed to cope with the flooding.

1.7 Literature Review

The following literature review tells about the natural calamities and the impacts on livelihoods of people. The following literature review also discusses the floods and floods impacts on the globe and in Pakistan particularly.

A Book named *"Extreme events: a physical reconstruction and risk assessment"* by Nott (2006) explained the causes of flooding and can be divided into two types: physical and human. Human causes included as huge urban development's and plants, and trees cutting for different purposes. The common causes of floods are environmental related, most particularly rainfall. Extended rainfall is the most common cause of flood worldwide. These rainfall events are frequently linked with several days, weeks or months. Human influences on river catchments and manipulate flood behavior. Changes in use of land particularly, have a direct impact on the level and behavior of floods. Result of deforestation enhanced in excess and often a decline in canal

capacity due to enlarged sedimentation rates. Among many natural disasters, floods are considered as more harmful than any other disaster as it brought more damage to lives. From the year 1986 to 1995, thirty one 31% of global economic losses and fifty five 55% of the casualties were flooded in dealing with natural disasters.

An article named *"Living and dying with glaciers: people's historical vulnerability to avalanches and outburst floods in Peru"* Carey (2005) argues that the destructive effects of the flood are likely to become regular, prevalent and more severe in future and the worldwide human population is vulnerable to natural calamities. Situations like geological location and importantly peoples income may increase the level of effect to which natural disasters have effects on the homes and livelihoods.

According to report *"Know Risk"* (2005) the study shows that, over the previous some decades the impact of natural calamities on economy demonstrate marked growing trend. These natural hazards hit most population in developing countries particularly, the least developing countries, rising their vulnerability and drop down their social and economic growth, occasionally by decades. Floods led to the damage of human being life, damage of economic and social, and transportation networks and degradation of already weak ecosystems. The study also show that social impact included alteration in way of living, their culture, customs, society, political structure, environment, health and physical condition, private and property rights and their uncertainties, desires and ambition.

A study by ICHARM International Flood Initiative (2003) shows that floods are the mainly taxing of water related calamities to human being, material properties and the cultural and ecological assets affecting community and their livelihood and claims thousands of lives yearly

worldwide. According to the study, many flood victims were upset mentally and emotionally, and emotional cost of floods was long.

A study *"Flooding in Australia: A review of events in 1998"* by Yeo (2002) demonstrated that about one-quarter of flood victims still had not recovered from emotional trauma of the flood events. The aspects that led to the non-recovery from trauma included severity of flooding, the degree of financial difficulties, and socio-economic status. The peoples whose houses are totally flooded along with this their income is low were most ill-affected. Hence, a brutal flood can put many emotional costs on victim, most of them quite severe and besides this these emotional strains may remain for many years after the incident. The communities that are aware with the severity of flood can be less suffer financially and socially, than those communities who have less awareness and knowledge about flood.

An article named *"Assessing community impacts of natural disasters"* Lindell and Prater (2003) argued that social impact creates many troubles for the long-term performance of particular kind of business and houses in an affected area. A proper emergency plan is required that provided the base for forecasting the events and the preparation to minimize the impact of flood and to protect livelihood in affected areas.

An study named *"A Flood Nowcasting System for the eThekwini Metro"* Sinclair and Pegram (2003) argued that floods cannot be stopped but their destructive effects can be reduce if warning of flood is give in advance. With huge population and growing urbanization, there are more people living in flood plains as this is only undeveloped property available near to urban cities. The people living in these areas are most at threat not just because of their geographical location in or near to flood plain areas but also, they do not have more funds to compensate from

damages cause by flooding. But with early warning information can, allow disaster management to take some emergency steps which may help may to the reduce loss of human being life and damage to land.

According to the study *"Floods: physical processes and human impacts"* Smith and Ward (1998), there despite huge expenses on flood security, losses due to flood continue to increase in many countries. Floods represent a "hazard" only where human advance into flood prone areas.

According to the study *"Assessing and affording the control of flood risk"* Lind, et al. (2008), there are many dimensions of the loss due to flooding. Additionally, along with the loss to economics and deaths and injury, there may be permanent losses of cultivated land, cultural valuables and loss of environment or natural valuables.

Kundzewicz, et al. (2002) in the article *"Coping with variability and change: floods and droughts"* argues that flooding is natural occurrence so that the danger of incidents is expected to be raise; growing intensity of exposure and inadequate capacity are between the aspects, that liable for the increasing vulnerability. Water related issues like flooding have been a primary concern since the begin of human civilization. They carry on hitting each and every human being generation, bring pain, death, and materialistic losses.

An article *"The management of riverine flood risk. Irrigation and Drainage"* by Borrows and De Bruin (2006) indicated that among all-natural calamities, more deaths happened in the world due to flooding than any other single natural hazard. From 1986 to 1995, due to flooding thirty one (31%) of economic loss and fifty five (55%) of the casualties occurred in the world. They also said that in the future, the destructive effects of floods are expected to be more severe, regular and prevalent.

According to the *"Characteristics of river floods and flooding: a global overview, 1985–2003. Irrigation and Drainage"* by Douben (2006) that in many centuries, people lived in flood prone regions because these areas have good geographic locations which assist in economic development, like transportation and fertile land for food productions. So, this reality forces people all over the world to defend the vulnerable resources against floods. However, floods are still most destructive than all-natural disasters and about more than half of all sufferers are flood related. In order to facilitate communities, it is necessary to enhance people's resilience to flood hazards and so for this purpose flood mitigation measures and strategies should be implemented.

Mirza, et al. (2003) indicated that floods effected diverse individuals, houses and societies differently and they cope with floods in different ways. Those who don't have the capabilities to recover faster from disaster they get into the many hardships than those having such abilities. Actions such as movement from floods affected areas, early forecasting of flood, flood insurance of livestock, food stocks, and early supply of health services and construct flood shelters are included in coping strategies. However, to attain the refuge from flooding, these strategies are not systematically woven into the approach. But if these approaches made on coping measures and try to find out new strategy, these approaches that can deal the social impacts of flood related issues affectively at a low level of social, community, financial and ecological cost than those approaches that attempt to manage or handle the resource base itself.

According to the Zahran, et al. (2008) *"Social vulnerability and the natural and built environment: a model of flood casualties in Texas"* that floods are the deadliest hydro meteorological calamities in the US. Study carry out in Texas that generally vulnerable populations bear losses excessively in terms of asset damages, injuries, and casualties due to materialistic impacts of disaster. For reasons of financial weakness, low human resources,

inadequate access to societal and political wealth, residential option, and migration dynamic are the common causes that contribute to the variation in disaster weakness and financial class.

Gao, et al. (2007) *"An assessment of flood hazard vulnerability in the Dongting Lake Region of China"* demonstrated that although often water short ages in China, but flooding continues to be the severe natural disaster. But all this regardless of massive efforts made to control the flooding by constructing structural engineering projects. The terrible 1998 flood in the Yangtze and Songhuo rivers, for instance, affected nearby one out of five Chinese districts. Though in the past floods less deaths occurred, the people living alongside to main rivers and lakes in China continued extremely vulnerable to floods events. About once every two (2) years China has suffered from a recorded flood disaster. Due to nationwide flood in 1931, in eight (8) provinces of China, almost four hundred thousand (400,000) deaths occurred.

Mohapatra and Singh (2003) stated in *"Flood Management in India"* that among all-natural calamities, in India flooding is the most common occurrence to be faced. Between 1953 and 2000 flooding have affected more than thirty three (33) million persons and this number may have increase due to growth in population.

An article *"Climatic regions of west Pakistan"* by Kazi Saeed Ahmad (1965), in his article he explains the what type of climate prevailed in the Pakistan and also described the climate problems in the country. It may assist in fight against the natural calamities like floods.

According to the one study *" Pakistan's flooding of July-August 2010: not only a natural Disaster"* by Iazaz at. el (2005) Pakistan is considered as the flood prone country in the world. Pakistan has faced seventeen (17) floods in the last four (4) decades, with different magnitudes and fifty (50%)percent of floods among these has been considered as major floods. The 2010

flooding was another super flood that struck the Pakistan after the mega flood of 1929. This study tries to explain the dreadful impact of floods and also involvement of human for the grave destruction due to floods. This study tries to explore where human is intentionally and unintentionally involved, lack of resources, less planning, and mismanagement causing floods and also recommend how in future we defend Pakistan from such hazards.

According to *"Linking access and vulnerability: Perceptions of irrigation and flood management in Pakistan"* by Mustafa (2002), regardless massive investment of Pakistan in the water sector, but still vulnerable to flood. Pakistan experienced huge flooding in 1950, 1956, 1973, 1976, 1988 and 1992; every flood affected about 10000 live. In the 1992 flood, the country lost more than three (3%) of its total GDP. A study carried in four (4) villages of Central Pakistan, the study shows that the people credited their floods vulnerabilities first and foremost to God's will, poverty, social and economic weakness and Government. Among the sixty six (66) years, the flooding has affected about 5,99,459 km2 of total land, affected 11,239 live, losses to the national economy about thirty nine (39) billion PKR and almost 180,234 towns were submerged. From 1950 to 2011 almost sixty (60) years of history showed that twenty one (21) floods were occurred in Pakistan and economic losses of nineteen (19) billion US dollars and since (2011-2013) last consecutive three-year Pakistan experienced two (2) huge floods adding more loss to this.

The Annual Reports by the *NDMA (2010, 2011, 2012, 2013, 2014, 2015)* described about in Pakistan, the annual disaster management system like structural setup of NDMA. These reports also discuss the response to main disasters in Pakistan like to floods, Heat waves, Air Blue Crash in Margalla Hills, PIA air crush, Earthquake, Drought, and but during the last eight years main challenge was floods in Pakistan. Over the last years, more than thirty million people were affected, and these led to huge migration, while on other hand due to infrastructural loss, it was tough task

to provide basic health facilities as well as continue educational services in the affected areas. All of these factors collectively rise the poverty in the country and also lower down the standards of living. These reports discussed the risk reduction plans and also provides the details of financial resources, human resources, accounts and audits of NDMA. The important points of every reports were challenges, successes, and recommendations.

DNA (Damage and Needs Assessment) a report by Asian Development Bank and World Bank, published in 2010. The main purpose of this damage and needs assessment was to measure the damage and losses occurred in Pakistan. It also calculates the total cost of rebuilding as well as relief provided to the flood damaged areas. The main principles of this DNA are the recovery strategy and needs assessment. (Pakistan Floods 2010: Damage and Needs Assessment;)

An article by Ali et.al (2014) *"Deforestation and its impacts on climate change an overview of Pakistan"* explains the impacts of climate change in Pakistan and say that there has been thirty one (31%) increase in level of carbon dioxide, fossil fuel burning up and deforestation at the present rate has resulted in rise of CO2 in the atmosphere. During last few decades enhancement in urbanization and raise in deforestation causing an alteration of climate patterns in Pakistan and deforestation over large area at a rapid rate further increasing the risk of landslides, flooding, droughts, rapid rate of glacier melting, and depletion of fresh water sources.

The literature showed that the households that socially vulnerable of floods have less or no preparation against the natural calamity. Risk of floods in future may predicted to be increase greatly because of both constant socio-economic development and climate change. Furthermore, it is clear from the literature that flooding have adverse effects on people. This literature review

recommends that the of long term impacts of floods on societies different from each other especially on socio-economic sector.

1.8 Limitations of the Research

The limitation of the study is to study and conduct fieldwork in the selected areas of Mianwali district such as Piplan, Kundian, Isa khel, Chashma, Kacha and Alukhail. The purpose of the research was to collect data and information about the calamity from the participants during fieldwork and interviews.

1.9 Organization of the Study

Chapter One: Introduction includes statement of the problem, research questions, conceptual framework, literature review, significance of the study and objectives of the study.

Chapter Two: Mianwali District in the Context explains the explain the Mianwali and informs the reader about the geography, history and economy of the region. It also contextualizes the population, literacy rate, main crops, main occupation of the district. The research has shed light on the climate and weather of the area.

Chapter Three: Impact of Floods on Lives and Livelihoods of the People: in this chapter of the study explain the impacts of floods on lives and different livelihoods of people and also what floods management activities were carried out in the area.

Chapter Four: Experiences and Damages during the Flood in Mianwali District: is an important chapter of this study which discusses impacts of the flood. This chapter also briefly explains the outcomes of a study carried out. It has described that what is the behavior of people

towards floods, how they perceive this and also what type of damages they faced during floods and in what ways they come out from the situation.

Conclusion: is the summarization and debate on the results drawn from the discussion.

Chapter 2

Mianwali District in Context

2.1 Introduction

The aim of the present chapter is to provide an overview of relevant information about the district. In this section of study discuss the brief history of district, its physical features, location, size, population, flora, fauna, main occupation, and floods history also discussed.

2.2 Ethnic Structure and Brief History

Mianwali till 16th century it was known as Kachachi and during same century its name was changed from Kachachi to Mianwali on the name of, Syed Mian Ali a saint, lived on the eastern bank of the River Indus. Syed Mian Ali Sahib migrated from Bhagdad (Iraq), who was a great spiritual saint laid the foundations of Mianwali. In those days Mianwali was called "Mian Ali Wali", which later was changed into the Mianwali. After him, for a long period his son Hazrat Syed Sultan Muhammad Zikria remained the holly leader and saint of the pathan tribes and other tribes of the area and settled all the clashes among the tribes effectively. He is known as Sahib-e-Karamat Wallee. His descendants are still respectable and have political influence in the area too. Being part of the Indus Valley, this district is one of the oldest human inhabitations i.e., the Indus Civilization. During the Indus Valley Civilization, Mianwali District was an agricultural region with forests (District Census-1998).

Historically, all the major rulers and invaders of South Asia governed of this area in their turn. According to the early history records, in early 4th century B.C this area was called 'Hindu Shahia' when Alexander the Great conquered India. The Vedic times is categorized by 'Indo-Aryan' civilization that conquered from Central Asia and remained in Punjab region. In 997 C.E.,

Sultan Mahmud Ghaznavi controlled over the Ghaznavid dynasty, established by Sultan Sebuktegin, Ghaznavi's father. The population of the Punjab region became majority Muslim, following the conquests by various Muslim dynasties from Central Asia.

The vestiges found in the eastern and northern parts of the district, propose that the area has been part of older civilization, however, it can be said that the in the southern waterless Thal there was no residence prior to 14th century due to non-presence of any livelihood sources. The area was populated by the migration of people from three sides. Awan come from north-east, from the valley of Indus, Jats and Baloch moved toward north into the area, and the Pakhtuns tribes came from the north-west. Jats essentially moved in the area for the economic and financial purpose while the area was safe heaven the fighting Pashtun tribes. Almost all the noticeable tribes of present-day Mianwali, come to this area after 13th century (District Census Report 1961).

Before the fifteenth century the lower part of the district was most probably occupied by a few dispersed Jat tribes, relying on cattle for survival. The Indus valley was a dense forest, swarming with pigs and hoard deer and frequented by tigers; while the Thal more likely not been occupied. Niazi Pathans entered in the area from the west and occupied both high banks of Indus during the reign of Lodhi dynasty. Awans who had been occupying the area previously arose in the eastern hills and settled in the grasslands beyond the salt range (District Census Report 1961).

Ghakkars progressed and became feudatories, during the Mughal time period. At the decline of Mughals and in the time of Nadir Shah's invasion of India, Ghakkars were relocated and driven out by Niazis. The area tumbled under the Sikhs for many years of nineteenth century. Sikhs ruled Punjab until the occupation of Punjab by the British, in 1849. During British occupation, the sub-continent was subdivided into provinces, divisions and districts. Mianwali and

Isakhel tehsil become a headquarters of Bannu district and then part of Dera Ismail Khan division of Punjab province in British rule (District Census Report 1961).

Khyber Pakhtunkhwa province was cut out from Punjab province, in November 1901 and the Mianwali, Isakhel, Kalabagh, and Kundian were separated from Bannu district and Bannu district became part of Khyber Pakhtunkhwa and with the headquarters in Mianwali city new district was made. The district became a part of Rawalpindi division. there were four tehsils namely Mianwali, Isakhel, Bhakkar, and Layyah. Layyah was included in the Muzaffargarh district in 1909. the district became a part of Sargodha division in 1961.Bhakkar tehsil was carved out of Mianwali district and made a separate district inside Sargodha division in 1982 (District Census Report 1998).

Within British rule, the sub-continent was divided into provinces, divisions and districts; after that, the independence of Pakistan divisions entered into the third level of government until 2000. The British had made the Mianwali as tehsil base camp of Bannu District then portion of Dera Ismail Khan part of Punjab province. In November 1901, existing district of Mianwali was formed. The area is principally populated by Niazi tribes followed by Awan (Malik), Jatts, Baloch, Syed, Sheikh, Mughal etc. Most of these tribes claim to be heirs of the invaders who came from Central Asia and Afghanistan. Tribal and cultural associations are still very strong. However, this tendency is presents signs of weakening with the spread of modern education, social consciousness as well as rise of a new class of people working in a foreign country (Ali Riaz, 2013).

2.3 Location

The Mianwali District is a district in the northwest of Punjab province, Pakistan. District Mianwali is border district between Province of Punjab and Khyber Pakhtunkhwa (KPK). People of

Mianwali share the culture of both provinces of Punjab and Khyber Pakhtunkhwa (KPK). Majority of population of Mianwali are ethnic Pakhtuns and are Niazis. In the northwest of the province Punjab the district Mianwali is located but it is situated approximately at the center of Pakistan and in the south-west of the capital city. The Kohat district (KPK) is located in its north and Attock (Punjab); Bhakkar district (Punjab) is situated in the south. Districts Khushab and Chakwal (Punjab) are in the east, and the D.I. Khan, Karak, and Marwat (KPK) are located in the west of Mianwali. Indus River flows across the Mianwali and separating the district into two parts, a start from the north-east and till it reaches in the south-west of the Mianwali to the D.I.Khan district (District Census Report 1961).

District Mianwali is geographically located between the north latitudes 32° 30′ and 33° 14′ N. and east longitude between 71° 7′ and 71° 44′ E. and has a total area of 5,840 square km. Almost one-third 1/3 area of Isa Khel Tehsil in the trans-Indus zone of the Salt Range and one-fifth 1/5 area of Tehsil Piplan and half of the area of Tehsil Mianwali are in the cis-Indus zone of the Salt Range and in the north the area is a continuation of the Kohistan-e-Namak and Potohar Plateau (Partnership-pakistan, 2006).

2.4 Maps of Mianwali District

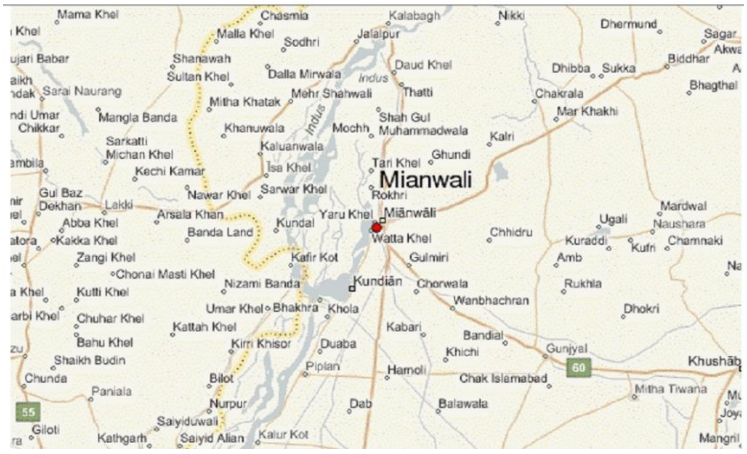

Figure 3.1: Map of Mianwali District

Sources: Google images

Figure 3.2: Map of Mianwali District in Punjab

Sources: Google Images

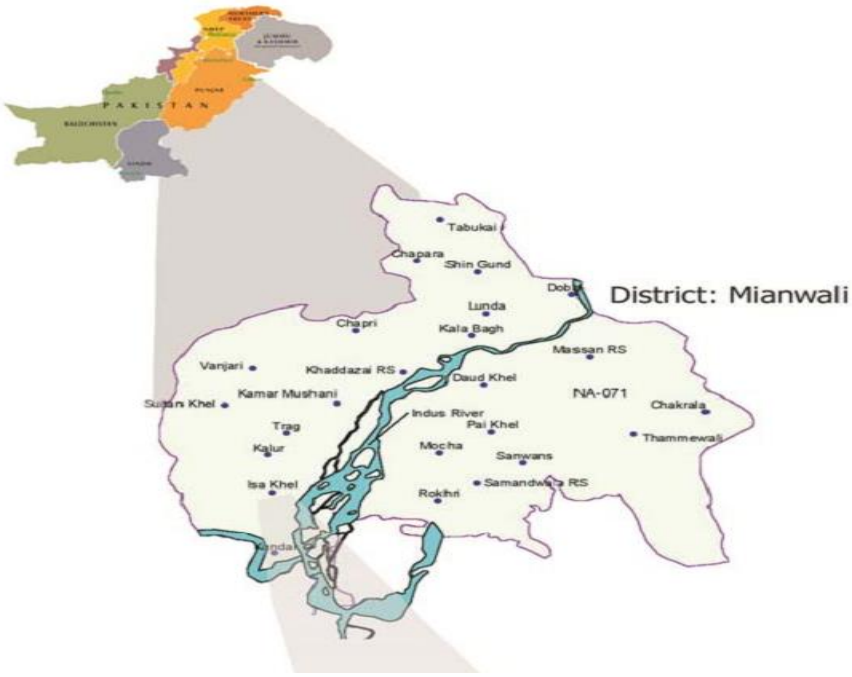

Figure 3.3: Map of Mianwali District in Pakistan

Source: google Image

2.5 Geographical Division

District Mianwali has three sub-divisions or Tehsils:

1) Mianwali

2) Isakhel

3) Piplan

Mianwali Tehsil is the largest of all the three tehsils. It is situated in the center of the district along the eastern bank of river Indus and with Isakhel tehsil on its west and northwest. While on its north Kohat district and south, all along eastern side of Mianwali district, both Mianwali and Tehsil Piplan are located, from north-east to south-east, Attock, Chakwal and Khushab districts of the Punjab. The Mianwali district comprises of several towns including Musa Khel, Mianwali, Kalabagh, Isakhel, Kundian, Daud Khel, Kamar Mushani, Mochh etc. Among these Mianwali main city is the largest town. Kundian is the second largest town where Chashma Nuclear Power Plant located, Chashma Barrage and Kundian - Jehlum link canal are located. Kalabagh is famous because of the red salt hills, Indus river, Kalabagh Dam and the Nawab of Kalabagh. Isa Khel is well-known for Niazi tribe, while Kamar Mushani is famous for minerals trade (Ali Riaz, 2013).

2.6 Physical Features and Topography

Mianwali divided into two parts: (i) In the north-east, south-west and north, a hilly land. (ii) In front of Dhuk hills and the Salt Range, a clay plain and in the south and the center a sandy plain. Mianwali district has a peculiar shape comparatively resembling to a human bust facing eastwards. Tehsil Mianwali forms the face and some part of the neck with the Sakesar hill resembling a sharp nose. The Isa Khel tehsil forms the back of the head with the Bhangi Khel area projecting at the

top like a crest. The important features of northern tehsil are (i) the adjacent mountains which useful primarily as catchment areas, supplying water through hill-torrents to the grasslands and (b) the Indus bringing down an immense supply of water. for cultivation the lands, above the high banks of the river depend on water from the hills or on local rainfall, the floods of the Indus supply, moisture to the cultivated lands lying within. The district consists of four mountain ranges (District Census Report 1961).

Figure 3.4: Mountain in Mianwali

Sources: Mianwali Vista

There are several mountains in the Mianwali and the main mountains are all along the Indus River and in the extreme north the Bhangi Khel, the Khattak hills, in the north and in the south-east the Salt Range and in the north-west Niazi mountains. The hilly areas have many steep mountains, deep gorges, torrents, ravines, and nullahs. In this area agriculture is possible on the plane hill-tops, slopes of the hill, and along the river bank and steams (District Census Report 1961). In the Salt Range, the Sakesar mountains were considered as a resort, have an attraction for tourists because of the greenery and pleasant temperature in summer and maximum height at

1,520m. The southern plain and central areas consist of cultivated area among the Indus River and its higher banks and sandy Thal desert (Imad, 2006).

2.7 Weather and Climate

The weather and climate of Mianwali are formed by a mixture of different factors like, landscape, nature of the area that is mostly hilly. The average height of area from the sea level, visible effects of the river as a huge area of the district lies on the banks of the River Indus, Arabian sea distance (Medhi, 2009).

Climate of the district as a whole is extreme with long hot summer and cold dry winters. June-July is the hottest months with average maximum temperature is 48 o C while December-January are the coldest months with average minimum temperature 4-5 o C. For the district as a whole the rain fall is scanty and uncertain. The rainfall in the area was not exceeded 44mm and in the August-September monsoons season, only up to 100mm. But, the rainfall anyplace above the River Indus even beyond the area caused a flood and this flooding caused damages in the area particularly in the low lying areas, Katcha, Nasheb, etc. and the areas near the river (Partnership-pakistan, 2006).

The highest flooding during the monsoon season from 2010 to onward, affected thousands of people, casualties, livestock losses, standing crops and properties destroyed also leaving several homeless. Most villages in “Katcha” or pond areas of Chashma and Jinnah Barrage had been flooded due to huge floodwater and affected numerous people, led to the thousands of deaths, livestock loss, standing crops. The fact revealed that the area was under the flood and this flooding was increased in the study area subsequently from the last decade.

2.8 Places of Interest

There are several historical places in the area which are famous throughout the country. Some of the majors are;

(i) Kalabagh

(ii) Chashma Barrage

(iii) Jinnah Barrage

(iv) Namal Lake

(v) Thal Desert

(vi) River Indus

(vii) Salt Deposits of Mari Indus

District Mianwali is the most attractive, presenting diversity of scenery. Traveling through boat from Kalabagh to Chashma Barrage, and when you pass through the valley, you might be on the Rhine. At Kalabagh, looking across the area of water, where Indus River flows, to the slopes of the Kalabagh estate covered with green clads (District Census Report 1961).

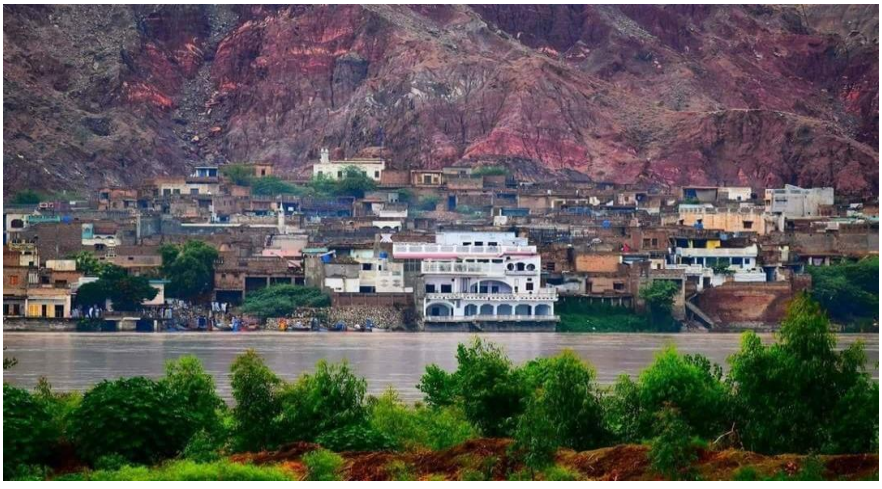

Figure 2.5: Kalabagh
Source: http://786mianwali.com/mianwali/mari-indus/chakrala/

Figure 2.6: Chashma barrage

Source: http://786mianwali.com/mianwali/mari-indus/chakrala/

Figure 2.7: Jannah Barrage

Source : http://786mianwali.com/mianwali/mari-indus/chakrala/

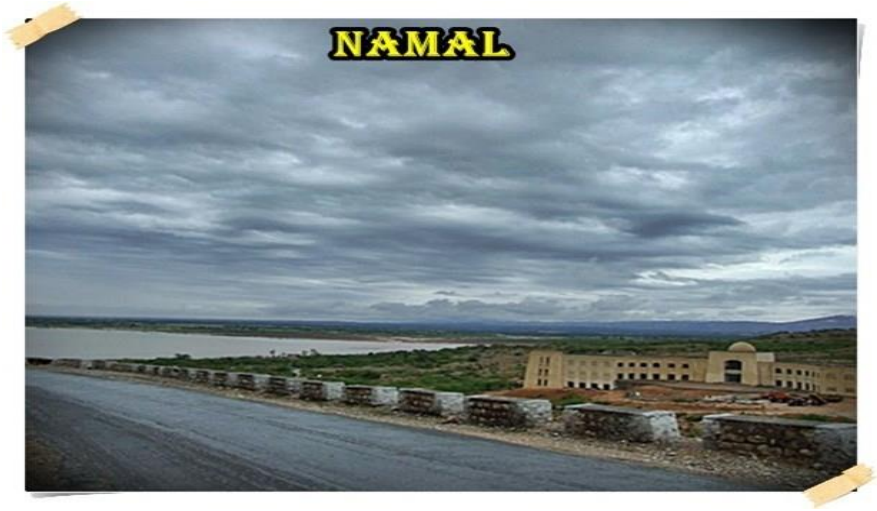

Figure 2.8: Namal Lake

Source: http://786mianwali.com/mianwali/mari-indus/chakrala/

Figure 2.9: Indus River

Source: http://786mianwali.com/mianwali/mari-indus/chakrala/

Figure 2.10: Salt deposits of Mari Indus

Source: http://786mianwali.com/mianwali/mari-indus/chakrala/

2.9 Hydrography

In district two rivers flow River Indus and River Kurram. The Indus River flows across the district, starting in the north-east and separating the district into two un-equal parts till it faces the district D.I. Khan across the river, in the south-west of the Mianwali district. River Kurram though insignificant as compared to the Indus, is a formidable strea; it enters the Isa Khel tehsil at the Dazra tang pass and flows almost east through the southern part of that tehsil until it gets lost in the waters of the indus. The river Indus has a great value to the district for irrigation purposes. the only lake of any interest in the district is the Nammal lake which has been artificially created by the construction of a large dam across a gorge between Nammal and Musa Khel. This district has an elaborate canal irrigation system in place. Off taking from the Indus at Jinnah Barrage, two systems of Thal Canal namely Mohajir Branch and Dullewala Brach irrigate an area of 123,024 acres in the district (Imad, 2006).

2.10 Geomorphology

The area mostly is in the “Pothwar” and “Salt Range”. The rocks which underlie the “Pothwar” are the soft gray sandstones and orange to bright red rock. While the Salt deposits are red and white

in color. Lime stones, clay, gypsum, coal, dolomite and stransium sulphate are important mineral recourses of District Mianwali and allied parts (Ali Riaz, 2013).

2.11 Soil

Landscape of the whole area is the combination of hills and semi-arid planes. So generally, the soil of the area has characteristic of both underlying rocks and are in consequence either sandstone detritus but there are wide variations. Lands of the Kalabagh near to Indus River are fertile. But remaining area is semi-arid, and soil is rich coming from floodwater, deposits from the Indus river and surrounding hills (Anon, 1968).

2.12 Area Statement

The total area of the district is 5840 Sq. KM. The forests areas vary considerably in size from 250 acres to 40220 acres (Medhi, 2009).

2.13 Linguistics Distribution

Although only 12% of the district population reported Saraiki as their ‘mother-tongue’ according to the last census, Saraiki, along with Punjabi are the most commonly spoken and understood languages of the people. Punjabi is the mother tongue of three-fourths 74% of the population especially in the rural district. Saraiki is more common in urban areas (20% urban population reported Saraiki as their mother tongue). About 10% population reported Pushto as their language (especially in rural areas of the northwest of the province, but also the Afghan refugees in the camps in the district) A very small minority identified Urdu (3.5%), Sindhi, Balochi, Brahvi and Dari languages (Partnership-Pakistan, 2006).

2.14 Population Size, Growth and Distribution

Population as a whole is sparse as compared to other districts of Punjab, but there is a marked difference of its density in the fertile "Mianwali City" area and the remaining hilly areas and upland plains of the district. The total population of Mianwali district is 1,057,240 souls according to the 1998 population census. It increased by 50% during the 1981-1998 intercensal period (17 years) at an average annual growth rate of 2.2%. The urban population was 17.3% of total population which grew at an average annual growth rate of 3.5 % during 1981-1998. Rest of the population that was about 82.7% which is rural (Anon, 1998).

According to 2017 census total population of Mianwali was 1546094 and the sex ration was males 100.27%. The Rural and the Urban population was (79.18%) and (20.82%) respectively with 7.1 average households' size. The total population growth was 2.02 from 1998 to 2017 (Nawaz-ul-huda, 2017).

2.15 Main and Subsidiary Occupations in Mianwali District

Mianwali located in the arid and semi-arid zones of Punjab. In the district, the source of income is influenced by its natural features and agrarian environmental setting as the main occupation was cultivation, 80% of the population directly indulged in agricultural and related activities. In "Kacha" or coastal areas of trans-Indus, occasionally flooded due to River Indus, quite smaller, scattered and temporary population residence have been possible. The similar tendencies are also seen in the sandy area and also in the mountainous areas with minor, scattered and semi-nomadic 1and nomadic groups are resided (Partnership-pakistan, 2006). Cattle and sheep breeding is also a subsidiary occupation in many agricultural areas but in Thal, and many big tracts are still barren

their dairy is the main occupation, and agriculture is subsidiary occupation (District Census Report 1961).

But, due to increased population and also with the development in the mining, manufacturing, business, and commerce this balance is disappearing gradually. About one-fifth of the total population resided in the urban area, which is similar to urban settlements in any southern district of Punjab (Medhi, 2009). Due to the ecological environments and the natural features the agriculture, cattle, animals and sheep breeding, and other occupation prevailed in the area. In Mianwali the literacy rate was not high because it was located in the semi-arid and arid zones of Punjab and the most people were indulged in the agricultural and related activities. But with the development of industry now wage labor was also an alternative occupation in the area and also seasonal labor also in the area (Partnership-pakistan, 2006).

2.16 Agriculture: A Socio-Economic Perspective of the Area

During the last two decades, the socio-economic structure of the area has considerably changed. The people of the tract are essentially agriculturists, but their holdings are too small to provide subsistence. The people also find it difficult to maintain large number of cattle. Ploughing by bullocks has been replaced by mechanical methods by 90%. Each family prefers to rear a few cattle or some goats mainly for milk. Herds of goats and sheep have almost disappeared except joint herds. The practice of stall feeding is limited. Browsing by bakerwals has been permitted by the Government in right-free areas causing an adverse pressure on the forests. People mostly depend for domestic firewood on forests, as only a small part of their requirements is met from private lands. Use of bottled gas in villages and piped gas in Mianwali city have greatly reduced dependence on forests for fire wood (Ali Riaz, 2013).

Proclaimed offenders have often found refuge in Kalabagh, Essa Khel, Mari Indus forests. As a result, the small habitations inside and around the forest have shifted to safe places releasing pressure on the forest resources to some extent. Economy of the major population, about 85% depends on Agriculture that is farming, forests, and Agriculture business. Highest average income was earned by those who have business in addition to agriculture, but agriculture still remains dominant profession and source of income in the study area. But there are certain problems in relation to agriculture that is, inadequate water for agricultural purposes (Arid areas), salinity and chronic land erosion in the area are major obstacles in the way of Agriculture development. In order to boost agricultural production, important measures may be adopted to solve these problems of the Agricultural land otherwise land will lose fertility and become arid and barren which ultimately cause bad effects on the socio-economic structure of the area (Medhi, 2009).

2.17 Irrigation in the Area

This district has an elaborate canal irrigation system in place. Off taking from the Indus at Jinnah Barrage, two systems of Thal Canal namely Mohajir Branch and Dullewala Brach irrigate an area of 123,024 acres in the district. Tube wells/Open surface wells, Rodkohi or flood irrigation, spill of rivers, karezes or springs irrigation also prevailed in the district.

2.18 Agroecology

The people of the area are essentially agriculturist and their main occupation is farming. Practically the whole population (85%) resident in rural areas and large proportion of the urban population is either engaged in or dependent on agriculture. They cultivate various crops such as Groundnut, Maize, Mustard, Cotton, Sugarcane, Rocket Seeds, Cluster Beans and wheat etc. large part of the area is cultivated by vegetables such as cauliflower, cabbage, Gourds, Melons, Radish, Turnip and

other green vegetables that is coriander, fenugreek, spinach etc. For market, potatoes and onions are also two main crops grown. People of the area have also the fast-growing trees such as Eucalyptus camaldulensis, Dalbergia sissoo, Morussp, Melia azedarach etc. for timber and fuelwood consumption (District Census Report 1961).

2.19 Fauna of the Area

Variety of the wild animals are found in different tracts of the area and are of considerable importance. The mountain sheep or Urial affords the best large game in the Kalabagh range and outlying spurs. The Ravine deer or Chinkara (Indian gazelle) generally called Hiran, occurs in the arid region of tehsil Essa Khel. The Jackal is occasionally seen and constantly heard in all parts of the tract. The blue rock pigeon is common especially in the Kalabagh hills. Domestic camels are also abundant in this area. The grey partridge (tittar) is fairly common everywhere but black partridge is found very rarely. Although there is a large variety to choose from, sport in the area is not good but game hunting would probably be more plentiful. If there were not such a large number of guns always ready to shoot it wherever it is to be found, and if netting and snaring were not such prevalent practices with the natives of the area.

2.20 Flora of the Area

The flora of the area is very unique due to diverse habitat, soil, topography etc. The forest range include the Kalabagh, Kunidan and Kachha forest near Indus river. There are various preserved areas. All the large landowners make their own rakhs, in which they carefully preserve the grasses and wood species and allow no one to trespass. Everywhere the most common tree is the Acacia modesta (Phulai). The more graceful Acacia nilotica (Kiker) is found along roads. Dalbergia sissoo (Tali) is fairly common in the richest parts of the area. The other commonest hill wood is Olea

ferruginea (Kao) and Prosopis juliflora (Velatikiker). Melia azedarach (Dherak) grows wild as well as planted on well's fields and houses. The Morus alba, (Chitta Toot), Morusnigra (Kala Toot), Eucalyptus sp. (Lachi) are found among roadsides trees in the area.

By far the common hill shrubs are Adhatoda vasica (Bekkar), Dodonaea viscosa (Sanatha), Rhazya stricta (Sawa veirana), Withania coagulens (Panirdodi) etc. The grasses of the area are of considerable importance as in many places where there is very little fodder to be had for the cattle. Similarly there is a great diversity of herbs in various tracts of the area. The common herbs are, Amaranthus sp, (Chauli) Boerhaavia procumbens, (GulabiItsit), Asphodelus tenuifolius (Bokat), Carthamus oxyacantha (Poli), Chenopodium sp, (Bathua), Silybum marianum (Kandari), Peganum harmla (Harmal), Trianthema portulacastrum (Itsit) etc (Riaz, 2013).

Adjoining to the arable croplands are the dry rugged low hills or mountain ranges with poor soils. They are generally represented by sparsely distributed scrubs of Adhatoda, Dodonaea, Periploca and Otostegia species with a large variety of grasses and a few trees of Acacia modesta, olive, Meliaor oaks. These areas generally serve as rangelands for livestock grazing. Unchecked grazing and extensive fuel wood collection during the last few centuries have changed it into scrubs (District Census Report 1961).

2.21 Flooding in Mianwali

The floods in Punjab caused a huge damage to the economy. Because of tragic events most of the agriculture areas, cash and food crops and also standing crops have been destroyed. Flooding is considered as a most destructive natural calamity in Pakistan and the types of flood changed from region to region. In 2010 Punjab hit by super flood during, monsoon season with devastating effect

on 11 districts and Mianwali is one of seven 7 districts that are severely affected by that riverine flood and also by hill torrents.

During the flood of 2010, about five 5 million cusecs of water flowed into the Indus River from these districts (PDMA, 2014). Although Punjab had experienced a flood in one or the way from 2011-2013, at that time district also affected not at intense degree but one of affected district. In 2014 Southern Nullahs and River Chenab swelled its banks affecting adjoining districts of Punjab. Huge financial losses (crops, houses, properties and social infrastructure) were incurred due to the floods in 2014.

The rapidly changing weather patterns, climatic changes, urbanization and choking of natural ways have left about half of the province at the risk because of riverine floods and hill torrents. Mianwali districts also severely affected by the heavy flood in the Indus River in 2014 September (Provincial Disaster and Plan 2017). In 2015 apart from riverine flood flash flooding also been observed in DG Khan, Rajanpur, and Mianwali district due to torrential rains. Resultantly, heavy flash floods observed due to devastating overflowing of hill torrents (Provincial Disaster and Plan 2017). As the flooding occurred and affected the area but one another fact that affected the area most of the Indus River flows across the area and the canal system for irrigation in the area also affected the area. As this already increase the water logging and salinity. In the study area rain not increase from 44mm and in monsoon, it did not increase 100mm. This was a normal occurrence in the area and people considered normal and don't make any plan if any big event occurred what they do. So, due to this and no alternative plan for the flooding in this decade brought huge damages in the study area. So due to this situation this research carried out in this area and find out the flooding impacts on the livelihoods of people.

Chapter 3

Impact of Floods on Lives and Livelihoods of the People

3.1 Introduction

Pakistan has experienced a vast range of natural disasters that includes earthquakes, floods, cyclones, draughts, landslides, and also some human induced disasters like terrorism, fires, epidemics, transport and industrial accidents, and refugees (migrants and internally displaced people) (Khan et.al, 2008). The worst events in Pakistan, which constituted huge human and economic losses, include the floods of 1950, 1973, 1976, 1988, 1992, 1997, and the massively destructive flood of 2010 (NDMA, 2010).

Pakistan experienced extraordinary rainfall in mid-July 2010, which continued until September 2010. The result was unprecedented floods affecting the entire length of the country. The floods have been assessed to be the worst since 1929. According to the National Disaster Management Authority (NDMA) the rains/floods have affected over 20 million people. Additionally, flash floods and landslides triggered by the rain caused severe damage to infrastructure in the affected areas. Entire villages have been washed away, urban centers have been flooded, homes have been destroyed, and thousands of acres of crops and agricultural lands have been damaged with major soil erosion happening in some areas.

3.2 Mianwali's Experience of floods

Mianwali is one of the poorest districts in Punjab province, ranking 29th out of 36 districts on the Multi-Dimensional Poverty Index. the Indus River crosses Mianwali at the northern end of the Indus Plain, which is in an intense heat zone that is affected by any rise in temperature. Surrounded by mountains in the west and north, and large areas of the plains along the banks of the Indus,

Mianwali District is historically prone to flooding and inundation during the monsoon season. Mianwali is comprised of three tehsils (subdistricts), including Isa Khel, which makes up the northern and western part of the district, Mianwali in the east, and Piplan in the south, as shown in Figure.

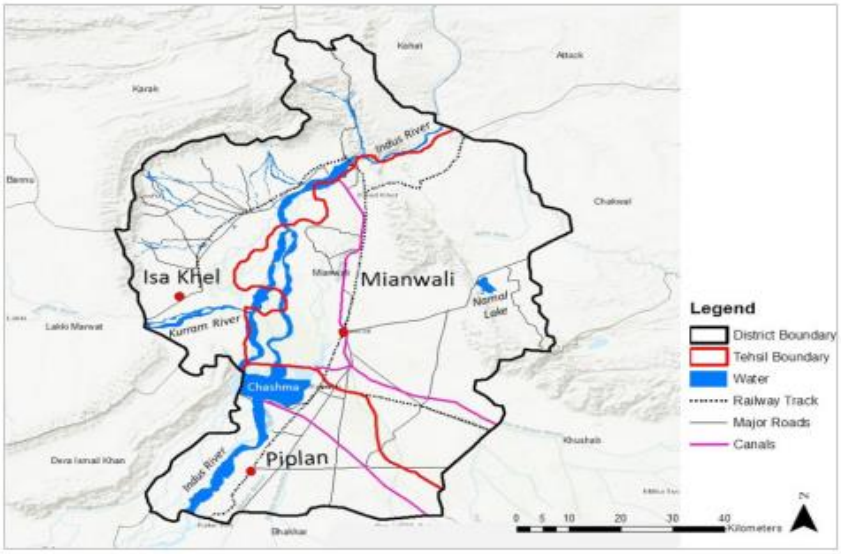

Figure 3.1: Key Topographic Features of Mianwali District, Punjab Province

Sources: Google Earth and UNOCHA

Mianwali District registered record rains in 2010: the maximum rainfall of 7 inches was noted on July 22 (SUPPARCO and FAO, 2010). In July and August 2010, the district received 482 millimeters (19 inches) of rain the highest rainfall in 50 years. Mianwali had an estimated population of 1.3 million at the time, of which 672, 322 more than half were affected by the floods, with 12 flood-related deaths reported. The district was one of the most severely affected in the entire country, incurring substantial infrastructural and health-related losses. The damage incurred in Mianwali comprised 6 percent of the total estimated affected population in the province and 29 percent of the affected geographic area in Punjab (NDMA, 2011).

TABLE: I Proportion of Population, Housing Structures, and Area in Punjab Province, and in Mianwali District and its Tehsils, Impacted by the 2010 Floods.

	Population		Houses		Area	
Region	Total (Thousand Persons)	% Population Impacted	Total (Thousand Structures)	% Houses Damaged	Total (Sq. km)	% Land Flooded
Punjab Province	93,682	6.4	14,870	3.3	205,344	29
Mianwali District	1,309	50.2	219	8.6	5,840	21.9
Isa Khel Tehsil	330	98.9	55	21.6	1,863	23.9
Mianwali Tehsil	645	34.4	110	5.3	2,689	21.0
Piplan Tehsil	334	35.5	54	0.7	1,288	20.8

Sources: Government of Punjab, Punjab Development Statistics 2010 and NDMA 2011.

Table shows that of the three tehsils in the district, Isa Khel was most devastated by the floods, particularly in terms of total population affected. Although all three tehsils had similar proportions of area covered by floodwaters, almost the entire population of Isa Khel was affected, compared to about a third of the population in the other two tehsils. This could be in part because Isa Khel was physically more exposed to the flood hazard, not only at the northern entry point of the district in the path of the Indus, but also because of its low elevation bordered by hills in the west, which increased its exposure to flash floods. The population of Isa Khel was living in the areas that got flooded, whereas the population of the other two tehsils either lived in areas that were not flood affected or were able to move to safer areas.

The maps in Figure show the courses of the Kurram and Indus rivers across Mianwali in 2008 and 2011, i.e., before and after the floods. The 2011 map depicts the extent of the spread of flood waters in the months following the peak of the crisis and confirms that a large population around the river would have had to shift away from their homes and farms at least temporarily to avoid high water levels. The intense flooding spread of 2–13 kilometers on the western bank (Isa Khel) and 2–8 kilometers on the eastern bank (Mianwali) of the Indus. The map for 2016 shows that the floods did not just pose immediate risks to the population, but also introduced new

waterways and topographic changes, characterized by the slight shifting of the Indus riverbed from west to east and a broadening of the banks of the river. This had direct implications, particularly for usage of land and cropping patterns.

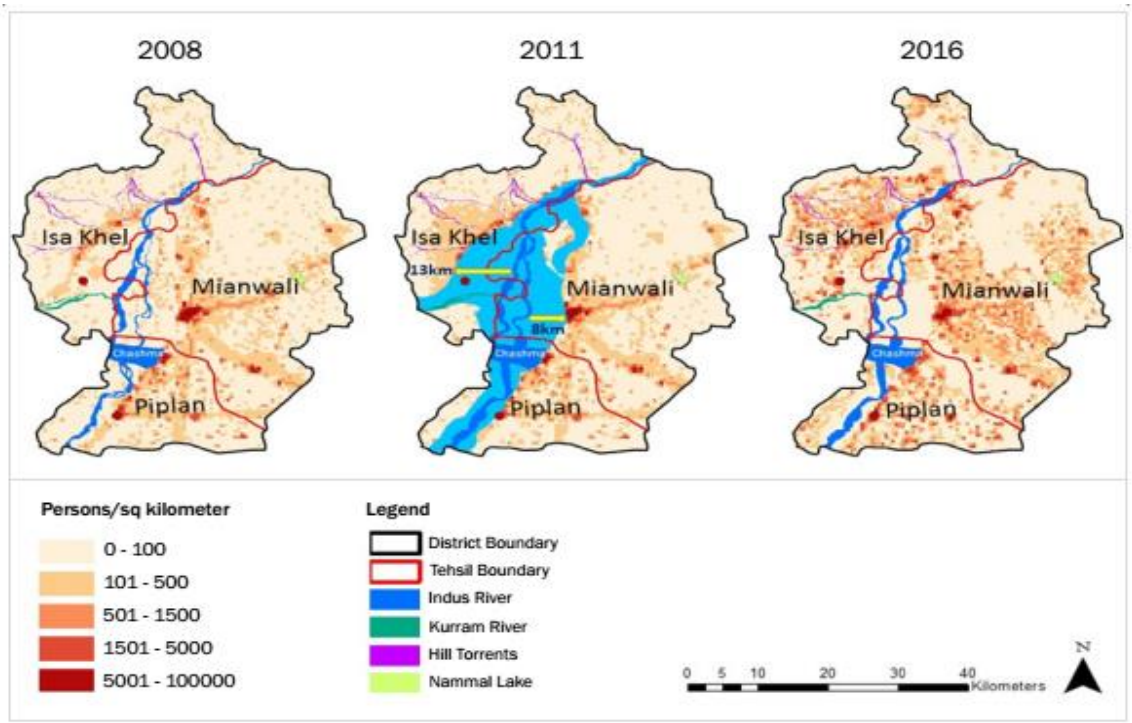

Figure 3.2: River Courses and Settlements in Mianwali Before and After the 2010 Floods

Source: LandScan Population Dataset 2008, 2011, 2016 and Landsat.

The questions posed above are addressed, in the discussion of the study, by looking at Mianwali District, with a focus on affected areas, to assess whether the floods were associated with or have been followed by any changes in the spread of population, socioeconomic well-being and livelihoods, and other health and social indicators.

3.3 Rainfall Season

The rainfall from 2010/11 to 2014/15 in rainfall season was categorized by fluctuating precipitation intensities which caused huge flooding that subsequently led to the damages to many sectors of the national economy due to the heavy rainfall in Punjab, KPK, Balochistan, and

Sindh provinces of Pakistan, which affected the Indus River basin also. Among total land area of Pakistan the one-fifth land was affected by flooding.

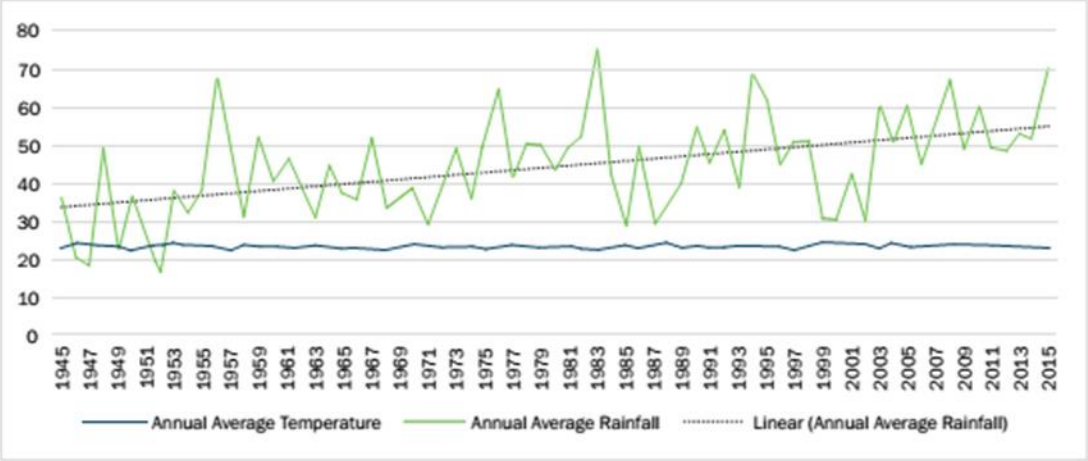

Figure 3.3: I Trends in Average Monthly Temperature (Centigrade) and Monthly Rainfall (Millimeters) for Mianwali, 1945–2015

SOURCE: Government of Punjab, Punjab Development Statistics 2010 and NDMA 2011

According to the report of National and Provincial Disaster Management Authority, that the floods of 2010 was straightly affected more than 20 million people, damaged the of property, livelihood, cultivated lands and infrastructure, death toll was close to 2,000. Due to the heavy rainfall started in the August 2011 have been effected the lives of millions of people. Rural areas were primarily affected. About 4.1 million acres land and also about 700,000 houses were destroyed, at least 150,000 people seek refuge in refugees camps.

In September 2012 the rains starts in different areas of country and affected more than 5 million people. Many parts of Punjab, Balochistan and Sindh were hardest hit in this rain. The flood was affected the 14,370 villages and about 1.1 million acres cultivated land were also affected. Due to heavy rain three million houses were fully destroyed and almost two million houses were partially destroyed. In August 2013 heavy rainfall of monsoon season was started caused flash floods and caused huge damage and losses across the Pakistan. Due to heavy rainfall

more than 1.5 million people were injured, about eighty thousands houses, and more than 1.5 million acres of cultivated lands were damaged.

In 2014, due to heavy rainfall more than 2.5 million people were affected, nearly 367 persons died, , and more than 130000 houses were fully or partially destroyed. The agriculture sector more than one million acres of cultivated land and standing crops also were destroyed including food crops and cash crops. In September 2015, due to heavy rainfall about 1.6 million people were affected, about 238 people died and 232 were injured. More than one million people were evacuated with 835 relief camps established. This was also created huge destruction in the study area and it was also confirmed through following.

3.4 Impact on Housing

More prominent and evident damages of floods were on houses and the degree of damages depends on the structures of walls and roofs of houses. From the observation of the researcher that the maximum sampled houses are “kachy makan” and made of mud. Most house’s walls are made of some pocca or (pukka) material, also with mud or other temporary material and with a permanent or solid material, backed or unbacked bricks, and with blocks. But the floor of almost all houses was made of mud or non-concrete material. The roofs of mostly made of mud and “TR guarder”, “Shahteers”, wood/bamboo or non-concrete material not with that material used in walls. Most respondents of the study said that after continuous rainfall the roofs of their houses showed the leakage of water and also said, the walls made of mud as well as bricks were soaked water. The house’s wall made of solid or permanent or backed bricks also soak the water that led to the damages in future to the houses. Consequently, the capability of water protection sustenance was very low in the area.

3.5 Impacts on Agriculture

Agriculture is the backbone of the study area's economy. Almost 85% people directly depend on agriculture for their livelihood. For the majority of the people, there is hardly any surplus land since the size of the land holding is very small. Very few well-off farmers have switched from domestic to commercial farming. It was seen that mostly the villages along the Indus River are suffering from river erosion whereas other villages are suffering from flooding and alluvium. Major crops, wheat, cotton, sugarcane, Mong, millet, groundnut, maize, gram, Guara, oilseeds, lentils, grass, vegetables, and fruits are reported to be damaged by the flood. Along with these crops for market, potatoes and onions are also two main crops grown. The highest damage is seen in cotton and the lowest in vegetables.

Some big landlords who have access to irrigation water they grown fruits in their lands and since the late 1970s after the canal irrigation system fruit cultivation became a significant occupation. More than six thousand acre area is under the fruit gardens and the fruit, orchids of Kalabagh and Wan Bhacharan are famous. Citrus fruits, zizyphus (bar), guava and mangoes are important marketable crops of the study area. This study area has an elegant canal irrigation system as one canal off taking from the Indus river at Jinnah Barrage and two Thal Canal systems Mohajir Branch and Dullewala Branch irrigated the total land of 123,024 acres. However, the study area has a canal irrigation system as it considered as good for crop production, but on the other hand, it also seems that the canal irrigation system has adverse effects on the cultivated lands. As this system negative impact of a growing water-logging and salinity, making huge land uncultivated. According to a rough estimate, approximately twenty-five 25% percent of the canal irrigated land was is under the water-logging (District Census 1998).

As the River Indus flow across the area and also canal irrigation system the area suffered a lot in repeated rainfall seasons and floods damaged agriculture. As most of the sampled households in the study area specified that their crop and agricultural land were damaged by the flooding. And It was also apparent that most of the main cash and food crops of the season were damaged by floods. The participants said that the during the floods the main problem was continuity of the flood water. The participant that interviewed almost all said that, then in the flood time due to huge rain. Main cash crops and all other cultivated lands were under the flood water and not only destroyed the crops but also the land. The estimate suggests that crop production has steadily reduced after the floods when it compared to the production with the 10 years ago. The productivity of land for almost all types of crops in the flooded areas has also reduced. The production of kharif crops was reduced due to river erosion, flooding and sand deposition while the reduction in Rabi crops is because of dampness and late cultivation.

All participants described that flood due to huge water in the river and canal water enter into cultivated land and static rainwater caused huge damages to the staple crops. The flooding has a negative impact on the agriculture because the flood water continues to remain in the cultivated land. To survive against waterlogging each crop has a definite time period, but when this time period ends, then the crops and yields were severely affected. It is clear that flooding is an enduring kind of hazard. So, the time period of waterlogging becomes lengthy for all types of crop and the more cash and other crops are easily destroyed by any flood.

3.6 Impacts on Property and Assets

The respondents of the study said that a considerable number of household's assets and properties were damaged due to floods included productive and non-productive. The productive assets included, hencoops or "Darba", fishing ponds, carts, agricultural tools and the non-productive

assets included beds, tables, chairs, other wooden furniture, kitchen tools, etc. Many households specified that floods damaged their properties like clothes and blankets. Most damaged were occurred in households who near to flood-prone areas.

3.7 Impacts on Livestock

The flood also caused losses of the livestock like goat/sheep, chicken, buffalo, and cow/oxen. The livestock has a great importance for non-agricultural and insufficient landowners, cattle farming is an equivalent activity of cultivation. As the animal husbandry is the second largest income of livelihood after agriculture. According to the 2006 livestock census one-third, 1/3 population of the areas have animals and the family whose also a source of income is livestock have two 2 buffalos, five 5 cows, and eight 8 goats. The small families of the area who ninety-four 94% percent in the area have the sixty-four 64% livestock, medium families who four 4% percent in the area and have eleven 11% percent of livestock and the large landlords only two 2% percent in the area and have 25% of livestock.

In the study area, many households completely depended on the income from the livestock. Many people who have a small piece of land or have no land have hens, 2 or 3 buffalo or cow and 4 or 5 goats use crop leftovers got from landowners or used large grazing lands along the canal. The milk got from animals little amount used for domestic purposes and the remaining was sold to the local milkman or they sold themselves.

The deaths livestock by flood of many others from unidentified diseases after the flood had an impact on the livelihood of the people. While chicken suffered from many health related issues like water borne and infectious diseases, buffalo suffered the food crisis in the floods. The food crisis of the livestock is one of the major problems during any floods in this study area because of

submerging of all grasslands and grass fields. When the water level of flood was increasing day by day, the livestock was shifted in the higher place of the house as well as some respondents said they also shifted their animal to the nearest higher places. The maximum grass fields of the study area were under the water during the flood so the food for livestock as well as shelter was a great problem according to the respondents. During floods the livestock also suffers from many kinds of health related problems very frequently, and it is very difficult to manage the medical service for sick livestock. Sometimes these cattle need to be shifted at animal hospital far from the locality.

3.8 Impacts on Road and Transport

The flood has damaged the existing cannel for water drainage or water pass. People reported that during monsoon rains the road situation is very poor due to continuous flooding. It is estimated that the flood damaged roughly most of the road in the study area. Almost in flood, during the monsoon period, heavy rainfall enhances a massive damage in all local roads and drainage system in the study area. Therefore, the rain water could not flow from the locality to the outside. The people of that that area totally depends on the local village bazaar and the village shops for their income as well as to lead there live.

The people living in the areas use, the local market to buy daily needs. In rural many respondents said, that there are no big shops or stores some landless or low landowners have a small shop at their houses and at that shop almost people could buy daily need basics. These shopkeepers have no huge stock they buy only a little amount from the distributors or brought from cities. These shopkeepers said that they effected in many ways like due to heavy rain and flood water the distributors could not come to them and they don't get the stocks timely or they don’t go to purchase the stocks from the market or flood water entire in their shops. So, in this way

shopkeeper and also the people, both suffered as the shopkeeper not have the stocks, so people could not get the basics to need. The flood water enters the shop and many edible products are destroyed. From the individual household interview it was found out that during the flood period all of the roads were overflowing from the flood water.

3.9 Impacts on Health

Of all respondents of this study, it was found that during the flood period health facilities were most commonly affected. The condition of all types of health center was very bad as the flood water goes inside those centers. During this period, different waterborne diseases like diarrhea, cholera, jaundice and skin related health problems are most commonly seen. Especially, children and aged people most commonly suffer from these types of health related problems. Primary treatment sometime might not be possible due to lack of accessibility of basic health facilities. Medicine facilities become a difficult service during any flood, said by the respondents of this study. On the other hand, the flood is a staid affect the pregnant mother's health. The pregnant mother could not get any types of health facilities during the flood time. For any types of health facilities could get very far from the flood prone area which was said by the local people of the study area. They also complained that the flood water is entire all over the area and the water is contaminated by different bacteria and poisonous substances, so that by the contact of this water could be harmful to human health, but they are bound to use this water in different daily activities because of the lacking of safe water.

3.10 River Spill Over Effects

Over flowing is one of the major secondary impacts after any flood in the river near areas. From the key informant interview it is noticed that, the river spill over after the flood is a more common

phenomenon. Local people of this area complained that, many areas were destroyed due to river over flown. Some of the participants of this study said that, they lost their cultivated land for the river over flown and also said that they are forced to switch their income creating activity from farming to business or day labor or any other. Participants said that, after flood the river over flown was seemed to be a dangerous secondary negative impact. Contentious river over flown bound the local people to migrate from beside Indus River.

3.11 Impacts on Local Society

Similar to damage of physical assets, the flood has also destroyed the social assets like: neighborhood, brotherhood and strong bondage of kinship. The rate of loss of social assets is continuing in the recent years. It was shared that when a community is hit by flood, many families are forced to evacuate in safe places for some period of time - some days to several weeks. As a result, all the social institutions are likely to be affected during this period. Indeed, the entire social fabric that defines a population as a community is seriously weakened. People are compelled to relocate, some permanently, hence neighborhoods are destroyed, friendships are severed, support networks are broken and domestic relationships come under greater stress.

Schools, social groups and families are apt to never be the same after the flood. After big flood, family roles and responsibilities undergo considerable change with worsening economic hardship and living conditions. It was also found that during the relocation, people are unable to adopt with the new environmental system to ease the situation in the study area. The flood-affected families were reported to be living with relatives, some as welcomed and some as unwanted guests, hence creating some crack in the social setting of kinship. The careful analysis of time line and trend analysis of the study area revealed that the effects of the flood are increase.

The flood damage is contributing in pulling the poor farmers in the vicious circle of poverty. The resource of water borne disease was the common phenomenon in the recent years.

3.12 Challenges faced during Flood

Some of the important impacts on the agricultural sector as well as the different challenges in the farming process after flood are discussed below.

3.12.1 Increased Expenses in Farming

People were affected in the study area have small lands pieces on which they cultivated the crops and many people in the study area taking other's land as sharecropping and on a rental basis (to cultivate on an annual basis) are the common practices. It is estimated that the population of the flood affected areas are who have no land mostly earn their livelihood either by cultivating other's land or by the daily wage laborer. So because of floods, agricultural affected hugely in order to invest in farming, they take loan from local moneylenders at high rate. The consecutive flooding put them in trouble.

3.12.2 High Prices of Seeds

Floods also damage stored seeds and grains and vegetables. The price rate is higher for the seeds and is mostly procured from outside the locality. The poor farmers are obliged to use the wet seed, which results in less germination.

3.12.3 Less Return from Livestock

High mortality rates of livestock are reported due to sudden attacks of diseases in pre-and post-flood situation. Also, due to poor food management, it is difficult to keep the livestock healthy and manage their appropriate feed during this time.

3.12.4 Poor Performance of Social Institutions

The social networks and institutions, which are considered as the assets of community, are destroy as people have no time to discuss and promote these networks and institutions. People become more individualistic to run their livelihood. With poor social networks, they are not able to secure the resources from outside. In fact, the social institutions have poor performance, which results in poor resource mobilization.

3.12.5 Changes in Cropping Patterns

Flood also impacted cropping patterns. Due to flooding and inundation, in majority of the cases, farmers were unable to cultivated crops on time. This delayed the harvesting of crops as well as plantation of winter season crops. The increased dampness is also responsible for the change in the cropping pattern. The change in cropping pattern often reduces the total crop production.

3.12.6 Increase in the Rate of Loan Amount

Overall after any types of flood the poor and landless people of the affected area are mostly suffering from a huge amount of loan from different sectors of the livelihoods. The mental stress increases day by day and the lifestyle also changes after any flood situation. It takes two to three months to set back to the previous one.

3.13 Local Knowledge on Flood Issues

Flood forecasting, early warning system, and community based flood management can save many lives and properties during and after the flood. During the field work, people in the study areas shared their local knowledge on flood forecasting, early warning and flood management

practices. It is necessary that any comprehensive flood management plan should take into account the existing local knowledge of flood affected communities on local physical condition, history and trends of the flood, local flood forecasting and warning approaches, and various other aspects of flood management.

This is necessary as people know the local context, the physical set up, the problems of floods and possible solutions better than the outsiders. While it is important to study existing local beliefs and practices for forecasting, early warning, and flood management, in the operational phase it is equally important to ascertain that they are useful and appropriate, and can be integrated into the disaster management plan. There are diverse ethnic groups and subgroups within the study area, including groups of local and outsider origins. Thus the local knowledge is not same everywhere in all communities. Nevertheless, the study tried to cover the whole area for the local knowledge in various aspects but it is difficult to cover all.

3.14 Floods Management Activities in Mianwali

In Mianwali district many governmental, non-governmental, many local organization and other voluntarily worked in the floods affected areas. Government has established relief camps, distributed food packs, clean drinking water and cattle fodder to affected people. Health department was operating mobile medical camps in the affected areas and providing essential medical care. PM Nawaz also visited the Mianwali and also He announced Rs 200 million for a water scheme in Isakhel and 1.3 billion rupees for preventing flooding caused by hill torrents (Daily Dawn, 2015).

A spokesman of the Provincial Disaster Management Authority (PDMA) said relief activities were carried out in the flood-hit districts of Mianwali, Bhakkar, Rahim Yar Khan, Dera

Ghazi Khan, Muzaffargarh, Layyah and Rajanpur. For this purpose, a total of 136 relief camps have so far been established in the Punjab province (PDMA, 2010).

The Punjab Irrigation department opened spillways of the Chashma reservoir on the mighty Indus River on Sunday to save Mianwali city and adjoining areas from the aftereffects of floods as the barrage has been filled to its maximum conservation level of 649 ft. The Mianwali district administration had requested the Irrigation department to open the spillways as the river Indus is already in medium flood at up-stream Kalabagh and Chashma barrage.

The Jinnah Hydropower Project was inundated and 750,000 cusecs of water were recorded being discharged from the barrage. The total capacity for the barrage is 900,000 cusecs of water and the barrage's left guide dyke was completely destroyed. A Mianwali tehsil municipal administration (TMA) official said that, the left marginal dyke also break. In order to save the Jinnah barrage and several neighbouring villages, the right dyke of River Indus had been breached. The water in Kalabagh was increasing and this was why the Jinnah Barrage and nearby villages were in danger (The Express, 2010).

Rescue 1122 and the Pakistan Army are carrying out rescue and relief activities with the support of the local district administrations. WFP has provided two boats to PDMA for rescue operation in district. According to the Rescue 1122 provincial monitoring cell, 582 people were evacuated in Mianwali district, a total of 3,264 flood-affected people were evacuated from Chachran Sharif; 1,028 from Chuhan village, 259 from Bhong village and 317 from Abadpur in Rahim Yar Khan district (PAR, 2015).

As soon as this disaster took place, NRSP started its relief activities all over Pakistan. NRSP is providing all kind of relief goods to flood affected through its own sources as well as

through national and international Humanitarian Aid agencies. The major share is that of WFP, Diakonie, USAID and Shelter Box (Anis, 2011).

NRSP under the Bahaal Project was assigned with the delivery of all project activities except for the component of agricultural inputs. The project activities that NRSP was responsible for implementing in the four districts of Mianwali, DG Khan, Rajanpur and Thatta were Agriculture and Food Security, WASH, Logistic Support and Relief Commodities and One Room Shelters (Affectees & Anis, 2011).

In line with its Corporate Social Responsibility, Bahria Town is very effectively taking part in the ongoing relief efforts for the recent disastrous flood hit areas. A special "Bahria Flood Helpdesk" has been established in this regard. Bahria Town is coordinating with DCOs of all flood affected areas. DCOs & residents of other areas can call anytime on the "Bahria Flood Help Desk" for provision of requested relief work in their areas.

Along with other affected areas, Bahria Town in Mianwali established Mobile Hospitals. Full provision of qualified doctors, nurses & medicines is available round the clock. They are equipped to perform small operations as well. Furthermore, free medicines are being given to the patients. In total 595 trucks containing eatables and shelters like, Flour, Sugar, Ghee, Utensils, Tents etc. have been delivered. Also, Bahria Town helped many affected people in the form of monetary compensation (Bahria Town, 2011).

Chapter 4

Experiences and Damages during the Flood: an Analysis

4.1 Introduction

During the discussion with key Informants Interview (KII) they described that, floods destroyed the physical setups like households, institutions, roads and transportation, shops, sports etc. and the floods destroyed the productive assets like cultivated lands, standing crops, and livestock. The area is one of the susceptible of floods because of Indus River flows across the area and the many floods in last years have dynamic impacts in the study area. Mostly in the study area people mainly dependent on the agriculture and related activities and the floods mainly damage the cultivation. During floods most of the participants described that the agriculture yields and also livestock was the hugely damaged.

This chapter provides a discussion on the results of the research based on the primary data collected. Its provides a discussion on the household demographics, livelihood patterns, impact of floods on various aspects, coping strategies, underlying causes of vulnerability and interpretation of results.

4.2 Household Demographics

The distributions of demography are such that out of the one hundred and (110) sampled households, eighty (80%) percent were male headed and twenty (20%) percent households were female headed.

Moreover, seventy four (74%) of the heads of households were married while eight (8%) percent were widowed and remaining eighteen (18%) percent were unmarried.

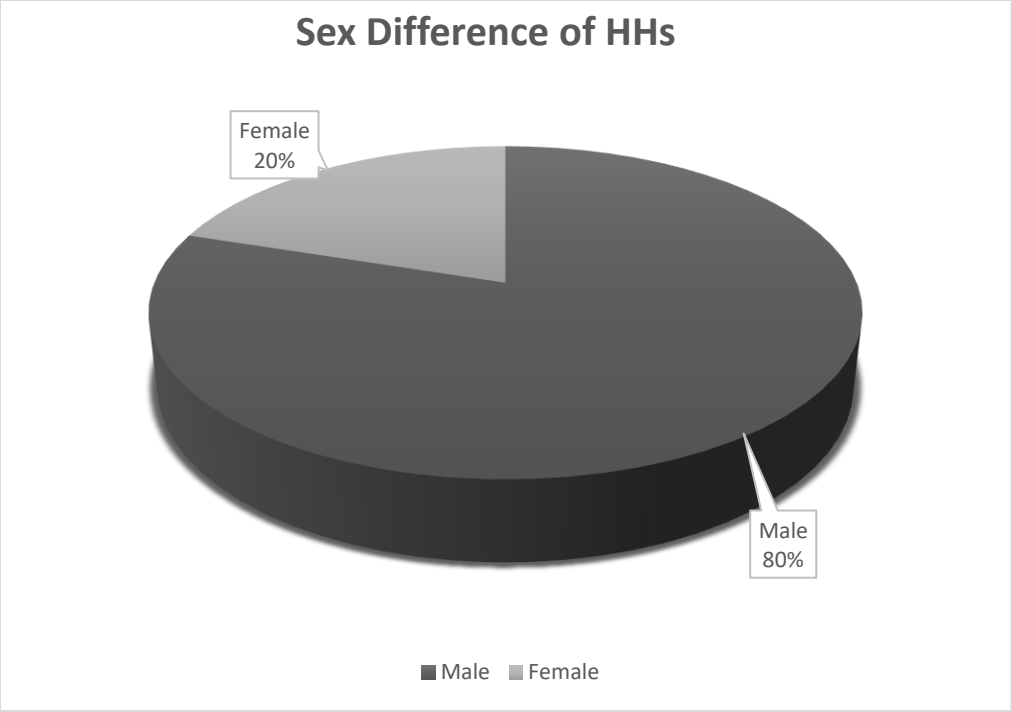

Figure 4.1: Gender difference of Sampled Households

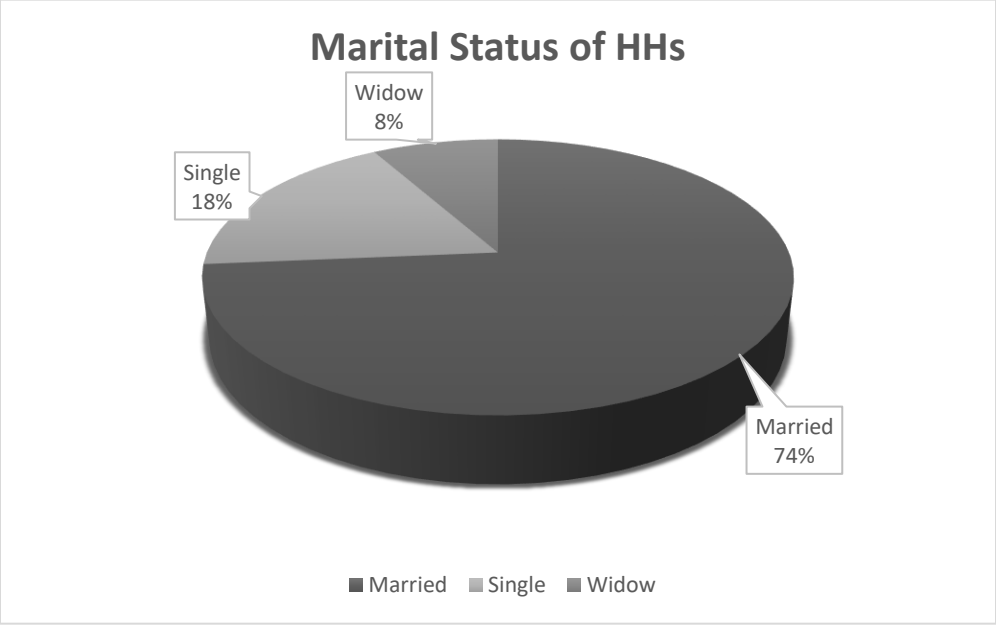

Figure 4.2: Marital Status of Sampled Households

The age of the heads of household, the results show that most of them were aged between (31-35), (41-45), and (46-50) years and the aged above sixty (60) years were very low in number.

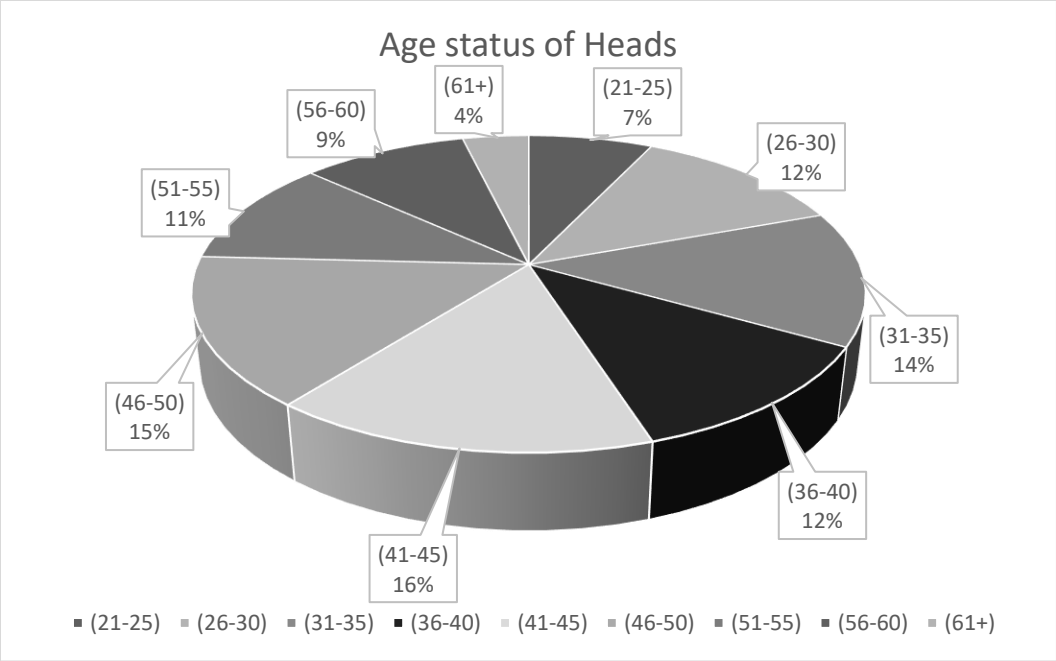

Figure 4.3: Age of Sampled Households

4.3 Household Size

The household was also considered and the research revealed the different household size. The researcher found that the mostly size of the sampled households was between 7-8 persons.

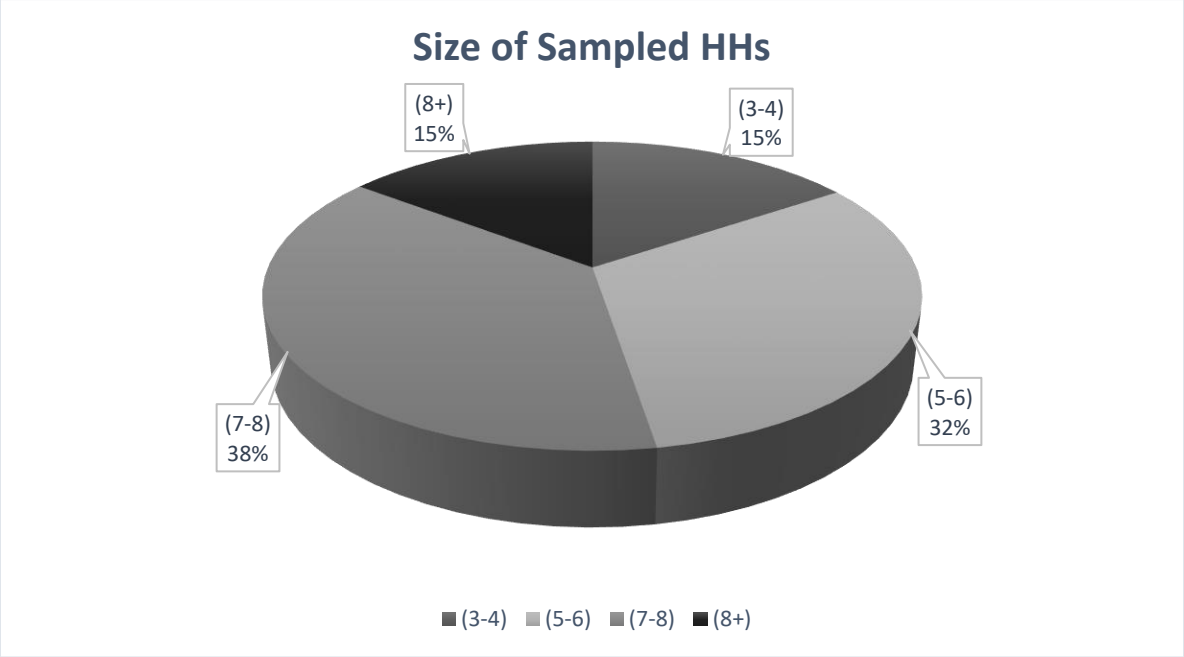

Figure 4.4: Size of Sampled Households

4.4 Livelihood Patterns

The researcher found the fact that agriculture was first most significant source of income in the study area directly and indirectly of eighty-five percent of sampled households were dependent on agriculture along with livestock, poultry and fishing as a secondary source of income. Own crop production, livestock, poultry and fishing was the main sources of sustenance in the study area and also other developed source of income like trading, business, jobs and industry laboring were prevailed, but agriculture is main source of income.

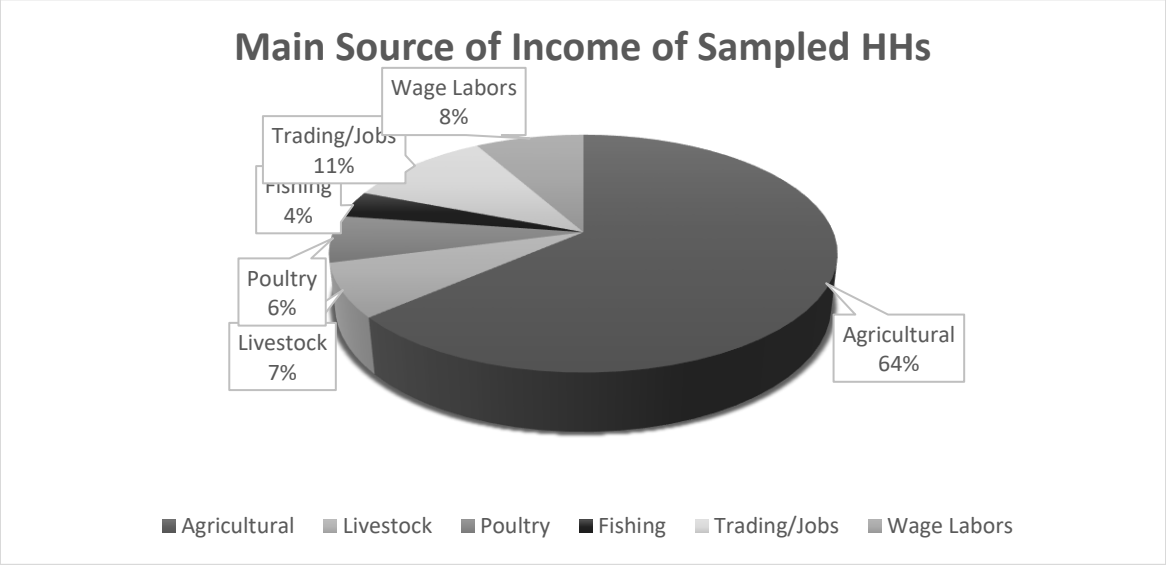

Figure 4.5: Main Source of Income of Sampled Households

During the survey one fact revealed that marital status of person was played a important role in selecting the livelihood pattern. The married household head had a diverse source of livelihoods (fishing, dairy, poultry farming, gardening, work on other lands, wage labor, work on brick burning, etc.) as opposite to the single person. The study also revealed the fact that who are single but with household size from 3 to 6 persons also have diverse source of livelihood.

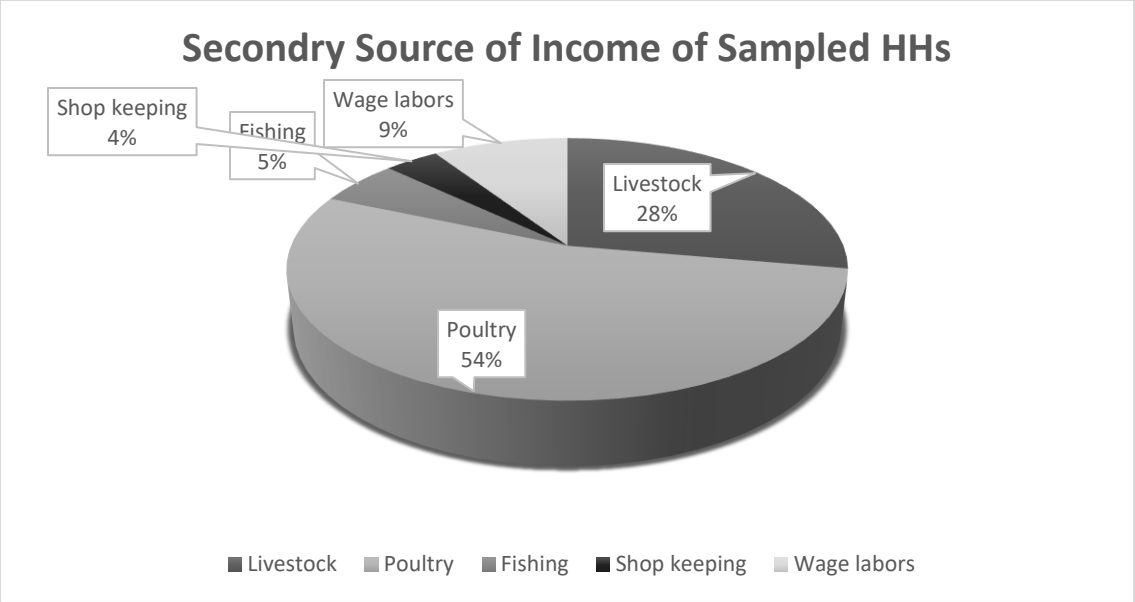

Figure 4.6: Secondary Source of Income of Sampled Households

4.5 An analysis of household's discussion on floods impacts

The floods in the Mianwali have huge effects on the peoples. The floods have dynamic impacts on lives and livelihoods sectors. Discussion with the local households demonstrated the floods impacts on the following sectors.

4.5.1 Housing Sector

Among sampled households, about fifteen percent of participants specified that "*due to extreme flood water and impacts of flooding houses were fully damaged and remaining participants said that partially damaged but not collapsed".*

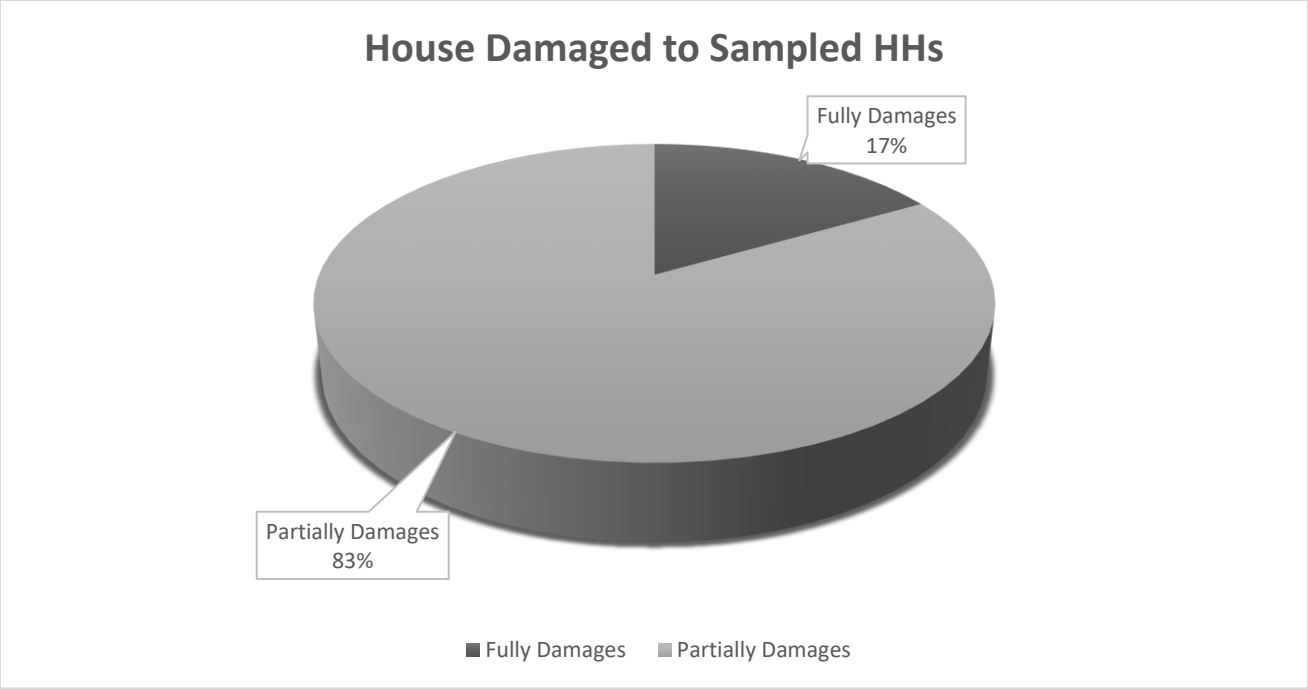

Figure 4.7: Houses Damages to Sampled Households

Further, due to floods whose houses collapsed, those people said that "*the huge rain water come in their houses"*. Around less than half of the participants said that "*the flood water arrived in their houses and this situation forced them to move to another place from their houses, but they still lived there as they said that it was very difficult to migrate and returned back".*

Almost all participants said that, *"the as a result of the huge rainfall in the area and the level of water increase, so that's why the rainwater come into their houses".*

Nearly hundred participants said, *"that because of massive and continuous rainfall cooking meals and food at home and fire at home was a very problematic task because they used bushes and wood for fire, but because of flood water all bushes and wood was wet not easy to fired and this make a very difficult situation for them".*

Approximately all the participants were said that, *"the flood water enter in their houses and the water damages the furniture and belonging so to save they raised them".*

Huge rainfall damages both houses and belonging and huge amount required, half of the participants described that "*they needed lots of money to rebuild house".*

During the discussions with households the researcher discovered the fact that *"some people during flood sent their kids to stay with their nearby and secure relatives and this disturbed their social networks and way of life".* Due to growing flooding water some participants temporarily shifted to their higher resident relatives and also some said they shifted higher place inside their own houses temporarily and they said that the for them cooking food and fire at home was most difficult, therefore, they while cooking food they suffer a lot.

The respondents of this study tell about, the two households who have parentally shifted to a new area because of repeated flooding and they sold out their lands.

Almost all participants of the study described that the flooding water remained in their houses for many days, so that's why the mixture of mud and water the outsides of house areas become more brittle and softer and during heavy rain, the roofs of their houses were leaking, and walls socked rainwater. In this study, it has found that many respondents have said that, in their household, the kitchens and room were the maximum affected areas by the flooding.

The main reason of housing damages is the structure of houses. The walls, roofs and floods made of non-concrete material and the roofs and wall socks the water and reason of damages in the area.

4.5.2 Property and Assets

The respondents of the study said that a considerable number of household's assets and properties were damaged due to floods included productive and non-productive. The productive assets included, hencoops or "Darba", fishing pounds, carts, agricultural tools and the non-productive assets included beds, tables, chairs, other wooden furniture, kitchen tools, etc. Many households specified that floods damaged their properties like clothes and blankets. Mostly damaged were occurred to households who near to flood-prone areas.

4.5.3 Livestock Sector

The damages occurred to the animal's shown in the figure.

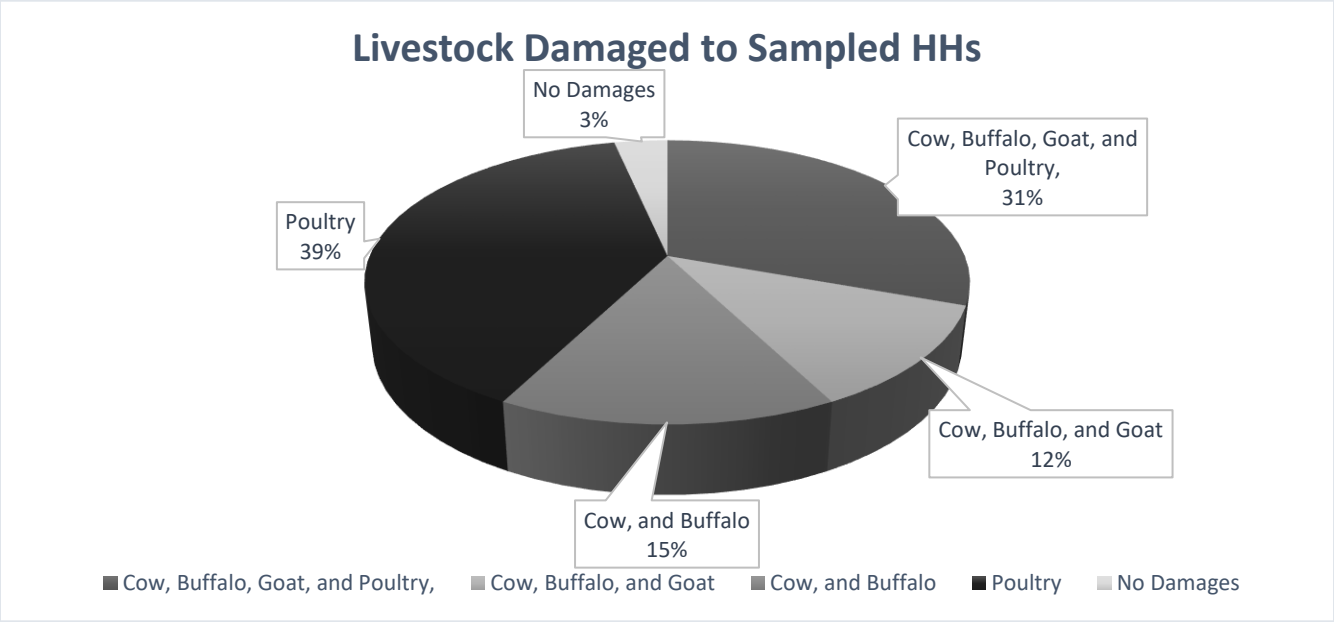

Figure 4.8: Livestock Damages to Sampled Households

During the flooding, the cattle and animals of many households suffered a lot and due to flood, the damages to the "*animal house*" was one of the main issue.

Many participants described *"the arrangemeent of food was a main problem for their domestic cattle and animals during the flood"*. The respondents provided diverse types of information about the livestock during the flooding.

Mostly participants of the study said that *"to save and rescue their domestic cattle and animals they suffered a lot".*

The respondents also described that *"as a result of the huge rainfall all green fields and grasslands from where their animal grazing, all were under the water so in floods arrangement of fodder and food for their cattle and animals was a problematic task".*

According to the respondents, *"to secure their animals and arrangement of save places and food, was not one problem but to save them from the huge flood water carrying them to another place was also a difficult task".*

The respondents said that, *"they suffered a lot to maintain food and safe place for cattle because huge of flood water and rainfall".*

Many diseases outbreak in the static water and in the affected areas the floods water remain and not only human but livestock faced many diseases. But during the flood many of water borne diseases outbroke in the animals and increased day by day and it was also a very difficult task to arrange the medicine for cattle and sometimes these were the viral diseases, spread from one animal to an others animal.

The participants of this study said that *"as a results of floods, lake of fodder, insufficient save places and outbreak of many diseases and viral diseases the death rate among the farm as well as domestic animal and cattle was high".*

Many respondents described that "*in flooding arrangements of fodder and shelter for animal was a very difficult task and many said that their cattle and animals suffered from many diseases and infections just because of low food quality and also due to static floodwater".*

One fact the study revealed that the participants were sold out their cattle because of low fodder and unsafe places to stay and in low prices.

4.5.4 Agriculture and Other Activities

In the study area, agriculture carried out through many types of irrigation. Indus river water is main source, and the area also have developed canal system and also through artificial sources like, tube wells. As the River Indus flow across the area and also canal irrigation system the area suffered a lot in repeated rainfall seasons and floods damaged agriculture. As most of the sampled households in the study area specified that their crop and agricultural land were damaged by the flooding and overflowing of Indus river.

And It was also apparent that most of the main cash and food crops of the season were damaged by floods. The crops were not only destroyed through rain and flood water but also as a result of delayed in sowing of crops. The participants said that the during the floods the main problem was continuity of the flood water. The participant that interviewed almost all said that, *"the in the flood time due to huge rain. Main cash crops and all other cultivated lands were under the flood water and not only destroyed the crops but also land".*

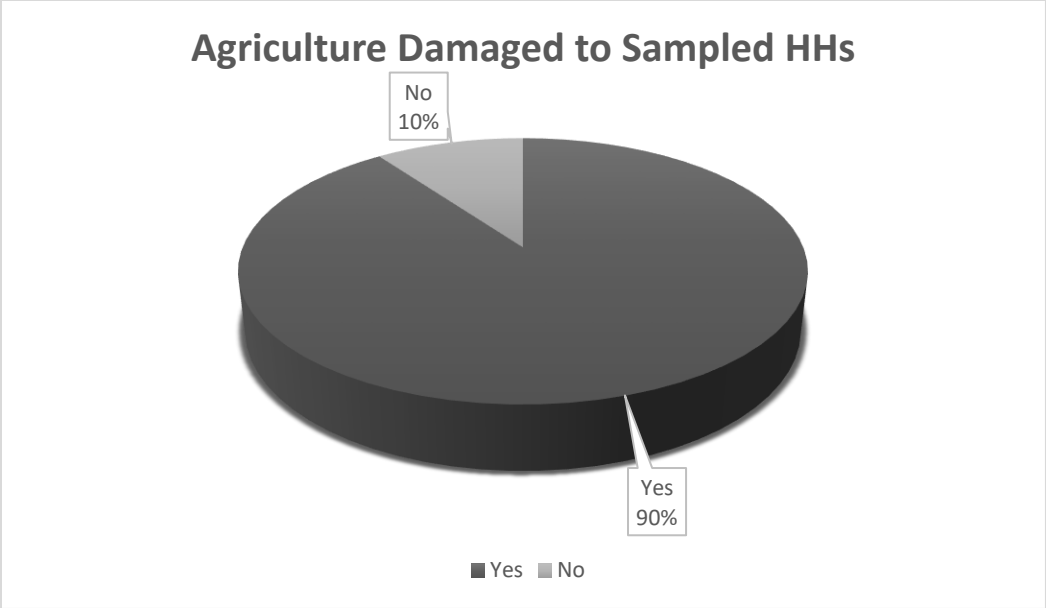

Figure no 4.9: Agriculture Damages to Sampled Households

All participants described that, *"flood due to huge water in the river and canals water entre into cultivated land and static rainwater caused huge damages to the staple crops".* The flooding has a negative impact on the agriculture because the flood water continues remained in the cultivated land. To survive against waterlogging each crop has a definite time period, but when this time period ends then the crops and yields were severely affected. It is cleared that flooding is an enduring kind of hazard. So, the time period of waterlogging becomes lengthy for all type of crop and the more cash and other crops are easily destroyed by any flood.

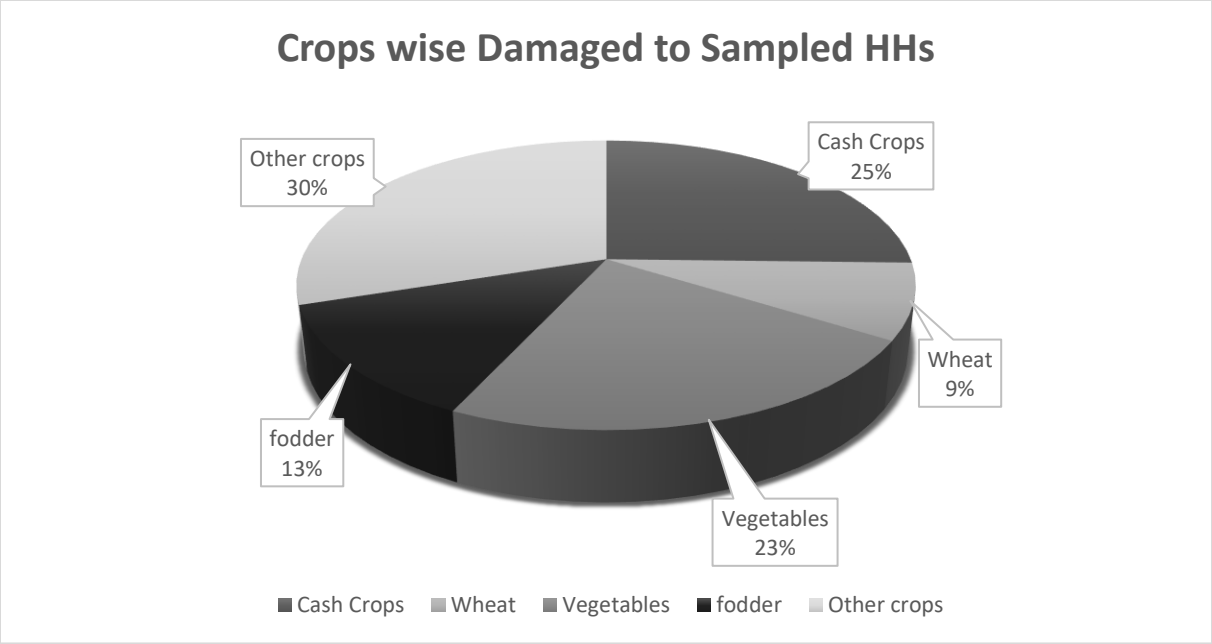

Figure 4.10: Crops Damages Experienced by Sampled Households

Every respondent said that *"the flood in 2010 and after that all flooding was unexpected without any notice or early signs".*

Consequently, *"it was a very tough task to save their cash crops from the flood and by the negative impact of floods not only cash crops are affected but also vegetables were affected by the flood water".* During floods, the food crises not only for human but also for cattle and animals is one of the issues.

More than half of the participants of the study said that, *"all crops were destroyed due to flood and the vegetable and fodders were also damaged by the static floodwater in the cultivated lands".*

The respondents said that, *"they along with other crops also grow seasonal vegetable and sell vegetable in daily market, they and also who purchase for further sell both suffered".*

Mostly household showed due to floods they experienced the food stock losses. The researcher also discovered the fact that the respondents whose food and crops stocks were destroyed by the floods, the mostly were lived in the flood-prone area.

Many participants in the study said that also their occupation was shopkeeping. In rural many respondents said, that *"there are no big shops or stores some landless or low landowners have a small shop at their houses and at that shops almost people could buy daily need basics".* These shopkeepers have no huge stock they buy only a little amount from the distributors or brought from cities. These shopkeepers said that they effected in many ways like due to heavy rain and flood water the distributors could not come to them and they not get the stocks timely or they don't go to purchase the stocks from market or flood water entire into their shops. So, in this way shopkeeper and also the people both suffered as the shopkeeper not have the stocks, so people could not get the basics to need. The flood water enters the shop and many edible products are destroyed.

During the flood, the poultry farming was affected in the area, many participants in the area have huge number of hens and cocks at their houses and some have their own small poultry farms. From the poultry farming, the production is reduced due to different diseases in the hen also the changing environment and temperature. Many households said that "*due to water-borne diseases not only affected the humans, animals but also affected the hens that were also one source of income".* They are selling the eggs of hens and sometimes cocks and hens for daily expenditure.

Many respondents said that fishing also prevails in the area, but it was also affected because due of huge flooding fish flew with flood water and reached in open waters.

There was some fisherman in the sample group households; they are fishing from the river and sold out for livelihood patterns but during floods, the river overflown by the water and all of the fishes were flown to open water. And the people do fishing also with agricultural for livelihood in the non-agricultural period due to flood suffered a lot. Some respondents have their own small ponds where they keep fishes and sold out these fishes in early ages.

4.5.5 Water and Sanitation Sector

In the area water pumps, hand pumps, water supply, tube wells, ponds, and canal were the sources of water. According to a report of UNICEF ninety, 90% percent of household have access to improved drinking water and only 10% of the population has safe drinking water access. The water quality equally not be good in all the parts due to comprehensive canal irrigation system and cash-crops cultivation and highly usages of chemical fertilizers and pesticides. Due to canal irrigation system growing salinity and waterlogging has also been affected the water quality severely.

The sampled household presented a different type of drinking water resources. The water situation was very grim in the area and the floods made the situation more horrible. Most respondents said that, *"the water and sanitation system were also affected".* All participants said that, *"the water resources and drinking water sources also were severely damaged".* The tube wells are polluted by the floodwater. Many participants said that, *"they collect drinking water far from tube wells because the water quality was not good in the water by hand pumps but the water of these tube wells and wells were contaminated with flood water".*

Many participants complained that, *"who used water supplied by the government was also contaminated by the rainwater and the taste was of water was changed due to the mixing of flood water".* Moreover, two-third participants showed that, *"the common drinking water resources*

were affected as during the flood nearly every tube well affected so it was problematic to achieve the drinking water".

Many participants said that, *"they brought the drinking water far from their areas and sometimes it was contaminated and due to this unsafe water, their members of the family, particularly kids suffered from many water borne diseases and infections".*

Sanitation facilities were also the most damaged in the areas in this study areas.

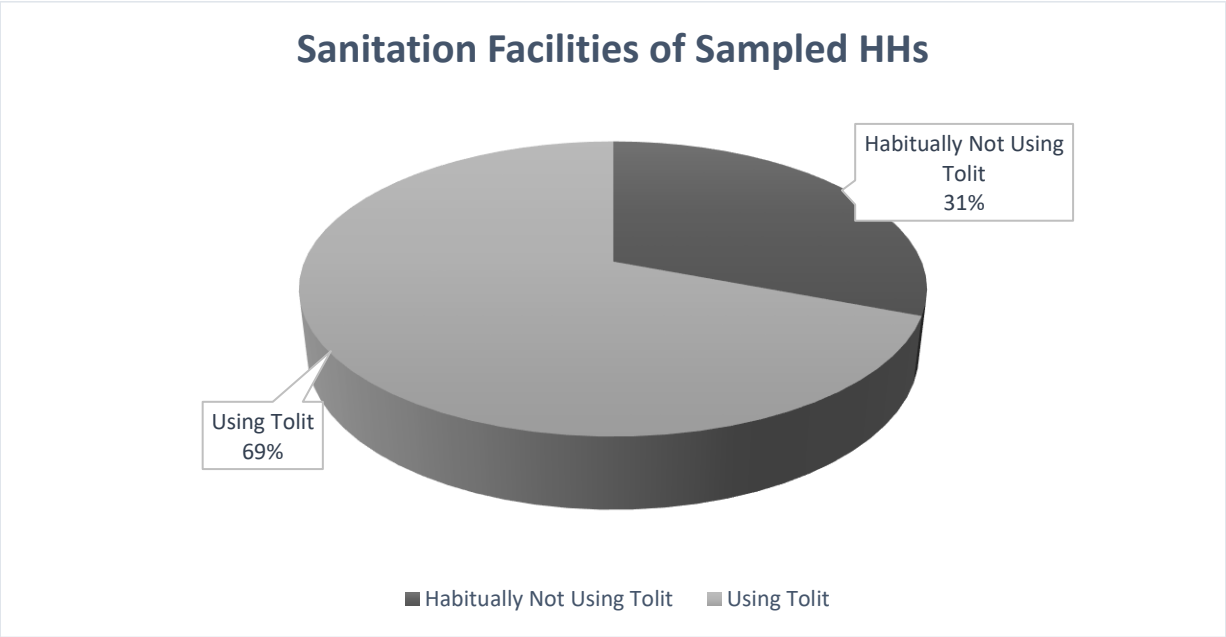

Figure 4.11: Types of Sanitation Facilities used by the Sampled Households

Many participants from the rural area said that, *"for their sanitation practices they use open place or fields in a normal situation but in the floods due to these sanitation practices, the flood water becomes polluted by many kinds of bacteria and poison because of these open areas and field filled with floodwater".* So, this type of floodwater generates many glasses of water borne diseases. During any type of flooding mostly tube wells and wells were filled with the flood water, and so the drinking water and other activities become inaccessible.

4.5.6 Health Sector

Following diseases were experienced by the households.

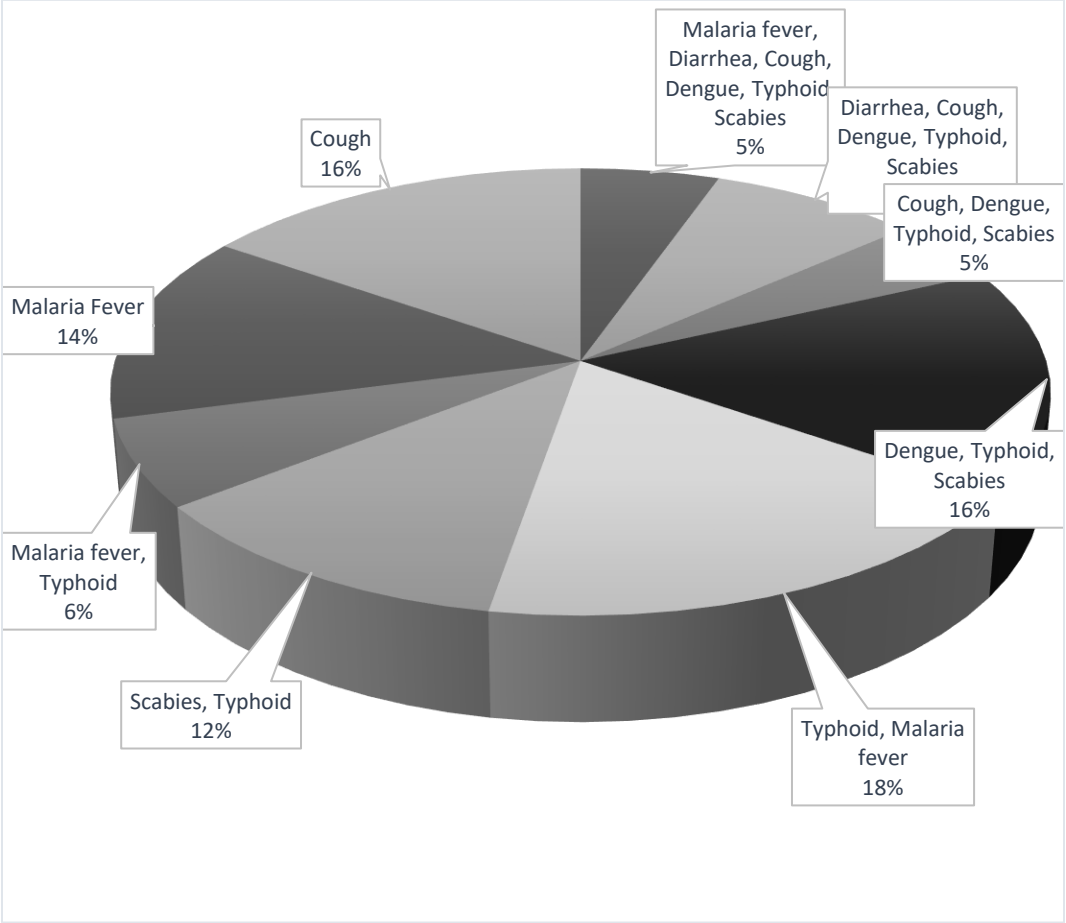

Figure 4.12: Diseases Experienced by the Sampled Households

The two-thirds of total respondents indicated that, *"one person from their household getting sick during the flood".* The most commonly experienced diseases were diarrhea, temperature/malaria, and cough, Typhoid, Scabies, and Dengue diseases.

Half of the participants said that, *"the flood water remained stayed for many days and sometimes road was under water, as a result, they move in the flood water".*

Some respondents said that, *"the transportation channels were not very developed, and these are "kachi sarak", flood water mud together becomes mired. So due to travel or walk in this mired people easily suffered from fever, diarrhea and skin infections".*

The respondents also said that; *"the treatment cost was also a burden along with other expenditure*". Moreover, half of the participants said that; *"during the floods, they faced the many diseases but along this, they also experienced more disease after the flood such as a cough, skin rashes, and infections".*

Many respondents said that, *"the wells or tube wells or open water was the source of drinking water by using this water they are falling ill, and this was as a due to increased contamination of flood water in the sources of drinking water that happens during flooding".*

So that borehole water was considered as safest and secure drinking water source. So, during the floods many diseases experienced by families due to diverse drinking water resources, most of the respondents talked about diarrhea.

4.5.7 Education Sector

In Pakistan, two type of education systems is prevailed government and private system. Both systems have their own education policies, rule, and regulation. The study area has also both systems. The flood history shows that the most common months of floods was July, August, and September. In this time in governmental and private institutions are closed because of summer vacations. But as above mention that both systems have own policies, rules, and regulations. So that is the way in study area many private instructions were opened, and educational activities remained to continue. So, during the interviewed many different views were discovered.

The educational imitations opened were the seriously affected in term of educational activities during the flood. In the study area irrespective of the fact many instructions were closed but the flood water was entered in many instructions as well as in opened instructions. So, in some educational institutions were closed down for the temporary time period. Due to heavy flooding teachers and students were unable to reach the educational instructions, so, many exams and classes were stopped and also many governmental educational institutes used for flood relief activities.

Some participants said that due to floods the flood water stayed in the area. So that, as water enters in the households and damaged the furniture and also flood waters also stayed in the instructions and destroyed school furniture and other premises which has massive economic losses. After the flood water went off from the area and also after the summer vacation when educational instructions were reopened for activities then the classrooms were unable for use due to the mired floor, ground and damaged furniture. Consequently, it took some time to start the activities. Some respondents said that after the flood with the assistance of the school teachers and the locals voluntarily were cleaned up the educational institutions and also other relief work.

4.6 Coping Strategies

During and after flooding, discussion with the sampled households asked about the strategies during the flooding that they employed. Most people don't use any strategy to cope with floods. Some coping strategies included is to migrate from damaged area to other area or to upper grounds, sell their belongings, switched alternative, depended on secondary and safe occupation.

These strategies depended on the household status as many households said that, *"they cannot migrate as they are married and have a family".* Some respondents said that, *"the migration was not possible because they don't want to leave their belongings and houses".*

Some said that, *"due to flooding there was a pressure on the other sector and high competition as they started working as wage labors".* Many people only wait for assistance.

But some people said that, *"in 2010 flood that they move to an upper place and some went to their relatives for some time and some said that they wait for the external help".*

Some said that, *"they did not know about the 2010 flood early, so they suffer a lot but in next floods, they suffered but not to that extent because of last year flooding".* Most people don't any give a description about any coping strategies.

4.7 Fundamental Causes of Floods Vulnerability

Several factors behind the susceptibilities of societies to hazards in Pakistan, which included poverty, weak early-warning systems, livestock, weak constructions, agricultural management, hard natural atmosphere, less awareness and lack of education, less communication, lack of infrastructure and limited facilities intensify susceptibility. (N. Disaster & Authority, 2011).

There were different causes of floods vulnerability for most people in the study area, like Indus River flow across to study area, relying on agriculture, living in the flood-prone area and importantly poverty was considered as causes in the Mianwali. The researcher founded that in the sampled households the main causes of vulnerability were poverty, relying on agriculture and huge rainfall.

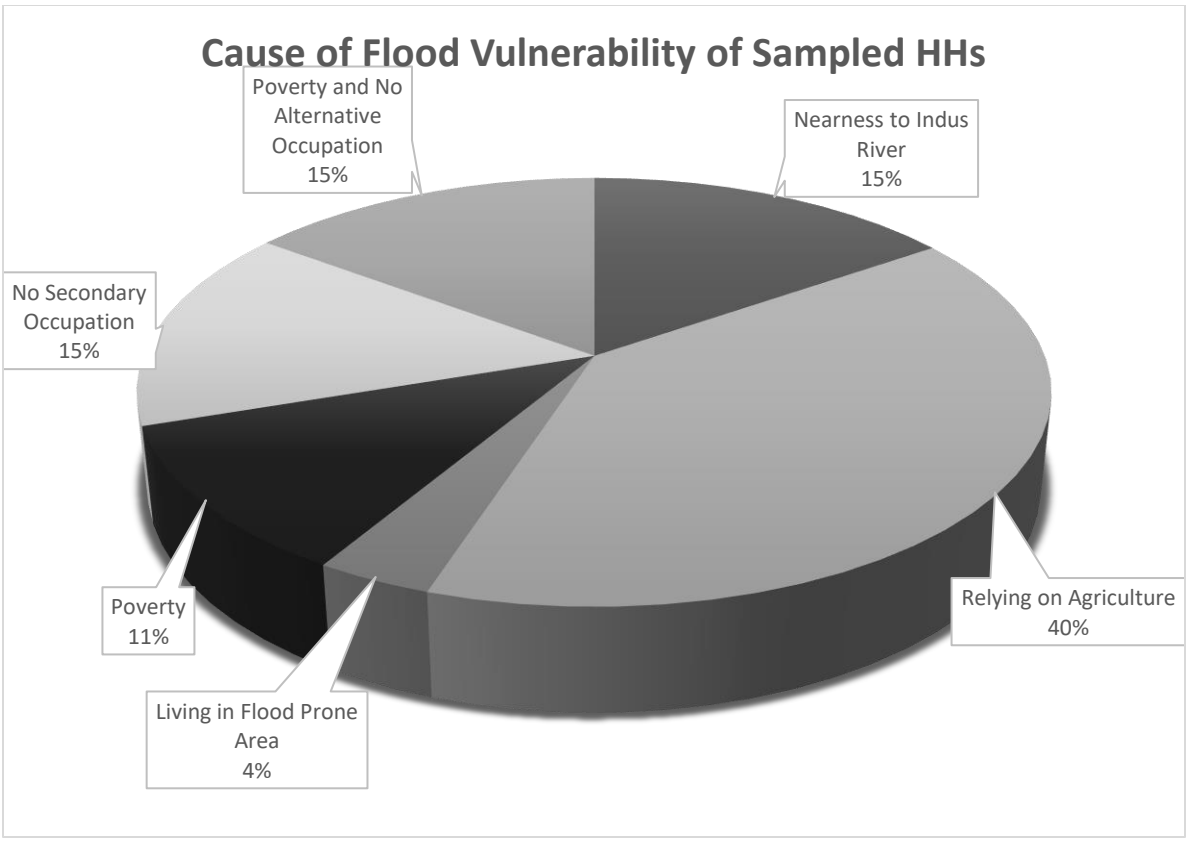

Figure 4.13: Cause of Flood Vulnerability of Sampled Households

The main reason for vulnerability relying on agriculture and poverty according to the sampled households. Many respondents have no secondary occupation so that is why they suffered according to them if they have so secondary source of income, they can survive even in the difficult situation. So along other causes flowing of Indus Rive across the area is also a main reason of vulnerability according to the literature and also from the survey. Therefore, it is essential to reduce the impacts of the flood the improve resilience of household by the elimination of poverty level and by providing another source of income which will decrease the vulnerability level from the area. Also, take other measures to eliminate the floods vulnerability by providing the awareness to the people by educating them through using a different medium.

4.8 Interpretation of the Results

The results of the investigation showed that the floods, primarily from the rainfall of monsoon seasons from 2010 to 2015 that damaged the livelihoods patterns like Agricultural lands, Educational Sectors, Health Sector, Water, and Sanitation Sectors, Houses, Property and Assets of people in Mianwali.

The primary source of income of the sampled households in the area was cultivation and the investigation showed that about 80% of households described about the destruction of crops yields, cash, and food crop and due to damages of food crops the insecurity of food at household was increased because mostly people cultivate the wheat for their personal consumption, surplus was sold out.

Under the livelihood pattern section, it was discussed that crop cultivation was the primary source of income. The income of people reduced, as flooding destroyed the properties, agricultural lands and sometimes standing crops were destroyed because sources of income are embedded in livelihood patterns. Furthermore, at the time of floods the households who had edible stocks, these stocks were also damaged and subsequently, those households faced food security.

Though the health facilities were limited, and these were damaged by the floods, and to access available services was difficult because of damage to infrastructure and due to huge rainfall and floodwater everywhere. This contributed to enhancing the burden on households and these diseases were occurred due to unsafe drinking water and bad and improper sanitation.

In the study area for most of the sampled household, hand pump and tube wells were the main drinking water source. The households will be continuing to vulnerable of the outbreak of water-borne diseases if the people used open water sources like wells, tube well or other and due

to the contamination of flood water in the open water sources happened during the flooding. So, the borehole water was to be considered as the safe and secure drinking water.

The flood also impacts on education sector was equally but not at a high level and the educational activities were disturbed due to buildings were flooded and infrastructure damaged.

The houses were damaged because most of the houses were made of mud or other non-concrete material. The results showed that an amount of non-productive and productive possessions was also lost or damaged.

Furthermore, the investigation shows that the smaller number of people used the coping strategies and mostly not using any coping strategies and the strategies that were used not very operative.

The results that the mostly peoples not employed any coping strategy as these strategies dependent on many factors and the main thing is the type of livelihood strategy and marital status and the important thing is an emotional attachment.

The survey results showed different causes vulnerability of people which posed a challenge, and this included poverty and relying on agriculture as are the main causes, living in flood-prone areas and lack of a secondary source of income are also increased the vulnerability of households. In the first chapter, the whole objectives of the study were described and to a large extent have been realized.

The floods cannot be reduced but there is a need to take measure to reduce the flood risk. For detecting the mitigation actions, susceptible people should not only involve but Civil Society and Private Sector should also be involved. Some measure and actions should be taken for risk reduction and implements of mitigation measures. Investment should be made for the management

of flood and on priority basis, climate change phenomena should be taken into account. Most importantly the awareness program for people on the flood risk should be promoted.

4.7 Implications

The main object of this study was to examine the impacts of the flood of the on the different socio-economic livelihoods sections of people in Mianwali. From the above mention facts it is cleared that the floods affected almost all sector of social and economic in the study area and one more important thing is that the poor and privileged section of society was more affected than other and the study was carried out in the rural areas of district. And the question who was more affected than the answer was very clear. And the question how floods affected socio-economic patterns than the above mention data and interviews were gave the answer of this question.

As purely no economic and financial data was collected as the flooding impact on the livelihood of households that would turn into the reduced income and purchasing power. The aspects that determine the causes of the household's vulnerability have been recognized and coping strategies and development were also recognized.

The findings and results of this study have been implications for the growth and development of the people in Mianwali. Hazards like floods demand that for formulating sustainable and suitable mitigation procedures and the efforts and energies should be directed.

4.8 Experiences during Survey

During the survey, the researcher found some other facts during the floods. The perceptions of people about the floods and other natural calamities and female the most important section of the society how they affected.

4.8.1 Perception of People

During the survey, the perceptions of people were asked about the floods and other calamities and how the people perceive the floods. Mostly people in the study area are uneducated and superstitious, and these people have seen everything in this respect. The people have the superstitious belief about the floods and other calamities that these are “Khuda Ka Azaab”. They said that when Allah angry to us than He sends that type of calamities and in this way, He showed His anger.

4.8.2 Performance of Religious Rituals

Many peoples said that due to flooding, along with other difficulties they also faced difficulties in saying Pray in Masjid. They described that due to the huge flooding as flood water enters the residence, likewise the flood water also enters in the Masjids. They said that due to missy roads and flood water they faced difficulty to go in Masjids. One thing more that they said that due to flooding and water-borne diseases in animals, many animals died. So due to that, they did not sacrifice animals on Eid for the fulfillment of Sunnat-e-Ibrahimi.

4.8.3 Impact on Female

During the survey, the researcher also talks to a female and asked them about the problems that they faced. As the study area was a very closed society. Female were considered as to remain into the houses and the women were used vail before going anywhere. But during flooding, they also faced many problems. As many women said that during the floods they faced one problem in availing of health facilities because mostly the doctors were male. They don’t like to be checked up by that male doctors and also due to a closed society.

Conclusion

This chapter presents the conclusion and recommendations that arose from the study. The research reviewed a wide range of secondary literature and collected primary data on which the conclusion and recommendations are based. The study was conducted within the Disaster Risk Reduction conceptual framework which emphasizes a proactive approach to disaster management. It is imperative that communities adopt a risk reduction approach to effects of floods. The research endeavored to answer the following questions:

- What are the impacts of monsoonal floods in District Mianwali and how floods affects the social and economic set-up in respective district?
- What are the main causes of frequent floods in the district Mianwali?
- What are the strategies employed by the residents to cope with this natural calamity?

It was cleared from the above discussion that flooding had bad effects on the different socio-economic section of the people in Mianwali. As discussed above and the study clearly described that the source of income plays a significant role in the floods vulnerability and in the settlement patterns.

It was also obvious that there are many causes of susceptibility of people in the study area and for minimizing or reducing this susceptibility it posed a challenge. In the study area, Mianwali common cause of vulnerability of people is poverty, residence in the flood-prone area, relying on agricultural. The main fact that the above discussion proved that flooding impacts in one livelihood segment can also disturb the other sections of the society. For example, it was cleared that in the health sector section, the diseases were out brook like malaria, diarrhea, and cough in the study area because of floods impact on sanitation sectors and resources of drinking water.

Further, the health services were affected due to floods and also one issue was to access health because of flooded roads. Due to damaged infrastructures education was also disturbed. The above discussion cleared that the most households in the study area don't employ any coping strategy to escape from the flooding impact and the person used any strategy was not very effective. Discussions with participants it was cleared that most people used no any strategy to coped with flooding because not workable and the conditions were not suitable in the study area. So, emphasis must be on improving the settings of livelihood patterns of the people and as of strategy to cope with the floods the people should be motivated to construct their houses with concrete materials or build "PackyMakkan" and lived away from flood-prone areas.

Furthermore, the Agriculture Department, floods management institutions and NGOs at provisional and also at the local level should through their services promote people to increase their incomes they should adopt an alternative source of income along with agriculture to decrease the food insecurity. The support programs were initiative to the vulnerable farmers and also provided other assistance to the people. There is essential to take improved and suitable measures and actions to lessen the impacts of the flood. To increases the people's resilience to floods, all players and stakeholders must be involved in the mitigation process.

Here suitable ways or solutions to highlight some policy guidelines, practical considerations, awareness and promotional programs, if executed than in the risk management of flood could play a significant role.

There should be build dams to store the excess water during rainfall season and this water used for other purposes like irrigation. To minimize and protect the risk of floods there should be encouraged the tree plantations among the people outside the areas. Government and other Stakeholders should take initiative for the flood risk awareness among the locals and also about

the climate change phenomena. To build community resilience there should be initiated and promoted community mitigation actions and measures. The long-term measures should be taken, and, in this regard, there should be developed an early warning system that early warns about the floods.

There is a need to investigate the system of floods early warning and the provided information on how used and when the warning was issued than what action and measures are taken by the people. There is also investigated into the adjustment of human to the flooding threat, primarily in terms of the perception and responses to floods. There should also be investigated the aspect during floods how women affected.

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Appendix 1: Household Questionnaire

"IMPACT OF FLOODS ON THE SOCIO-ECONOMIC LIVELIHOOD OF PEOPLE: A CASE STUDY OF MIANWALI DISTRICT PUNJAB"

Province:

District:

Interview Date:

1. Household Demographics

Sex of HHs Head	M/F	Age	Marital Status	HHs Size

2. Livelihood Patterns

2.1. What is the major livelihood strategy of household? (rank 4 of them)

1. Agriculture
2. Livestock farming
3. Fishing
4. Job/Trading
5. Horticultural production
6. Wage labor
7. Other; specify

2.2. Specify secondary livelihood strategies (more than one possible)

Livelihood Strategy	**Yes / No**
Agriculture	
Trading	
Livestock Farming	
Fishing	
Horticultural production	
Job/Trading	
Wage Labor	
Other; Specify _____	

3. Impacts of Flood on different sectors

3.1. Housing

Give description of your house.

_____

_____

Due to floods did your house collapse?

_____

_____

Did you relocate due to the collapsing of the house?

_____

_____

What type of damages occurred to your houses?

_____

_____

3.2. Property/ Asset

Did any loss of the following property or asset? **Yes / No**

Bed ☐

Plough ☐

Chairs ☐

Table ☐

Kitchen Tools ☐

Others; specify:_____

3.3. Agriculture

List the crops that you grow:

_____

_____

_____

Did the any damage to crops during the floods?

_____

_____

Was any cash crop damaged?

_____

_____

Did during the floods any loss of food stocks?

_____

_____

3.4. Education

Described education facilities in your area.

_____

_____

Any damage to school infrastructure

_____

_____

Any school going kid experience disruption in going school?

_____

_____

If yes, why? Indicate reason

Infrastructure disruption ␣

Bridge Submerged ␣

School submerged ␣

surrounded by water ␣

Other _____

3.5. Health Sector

Any health facilities in the area.

_____

_____

Any damage or losses to health facilities

_____

_____

any difficulty in access to health services

_____

_____

any of the your household members get sick

_____

_____

Which diseases were experienced

Diarrhea ⌴

Cough ⌴

Malaria/ Fever ⌴

Measles ⌴

Dengue ⌴

Others Specify_____

3.6. Water and Sanitation

source of drinking water

Borehole ⌴

Water Supply ⌴

Tube well ⌴

Hand Pump ⌴

Pipe (Nul) ⌴

Other (Specify)_____

Was the main source of water affected by the floods?

_____

_____

What type of sanitary facilities do you have?

_____

_____

Was your sanitary facility affected by the flood water?

What are the fundamental causes of vulnerability?

Flowing Indus Water Flowing across the area

Residing in a flood prone area ⌴

Poverty ⌴

alternative livelihood(s) ⌴

Relying on Agriculture ⌴

Other; Specify_____

5. Coping Strategies

5.1. What are the main coping strategies that you employ during floods? Rank them in order of importance.

_____

_____

_____

_____

_____

Are the above coping strategies effective?

_____

_____

Research title: **“IMPACTS OF FLOODS ON THE SOCIO-ECONOMIC LIVELIHOODS OF PEOPLE of PAKISTAN: A CASE STUDY OF MAINWALI DISTRICT OF PUNJAB”**

I am participant of the study, name is _____, and fully aware of the procedure and aim of the study. I know about my profits and troubles of study. I have also right to reject or leave myself from this study at any time, so I am not restricted to any individual about any details of my causes of withdraw. Also, all data should be kept in safety. Just researcher can utilize my data in his study. Throughout publishing the study researcher not utilize any kind of name identification indicator. No identity will be published without my consent. I know all the things and freely contribute in this study.