

Economic Impacts of Floods on Livelihoods of UC Agra District Charsadda



By

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(NUST201464375MMCE15714F)

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

Master of Science

In

Disaster Management

Military College of Engineering (MCE)

National University of Sciences & Technology (NUST)

Risalpur Campus, Pakistan

2018

This is to certify that the thesis titled
Economics Impact of Floods on Livelihoods of UC Agra District Charsadda



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Dedicated to

MY BELOVED PARENTS

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MY WIFE

For their everlasting love and continuous support

ACKNOWLEDGEMENTS

First of all, I would be thankful to Allah Almighty who gave me strength, courage and wisdom to undertake the research in a befitting manner. Completion of this research is the result of cooperation of many dedicated and helpful people. First, I express my gratitude and sincere appreciation to my worthy advisor **Maj Dr. Naeem Shahzad** for his utmost guidance, patients and help rendered to me. No words suffice the extent of my facilitations to **Maj Dr. Rai Waqas Azfar Khan, Assistant Professor Zarmina and Mr. Aamir Mufti, Committee Members** for their prodigious interest and assistance out of their busy schedule in helping me. I am obliged to Mr. Salman Mulk for taking interest in streamlining the scope of research work and paying special attention to the problems during research work by extending their help very generously. In the end, my gratitude and abundant thanks to my family for their continuous encouragement.

(Zohaib Fazal)

ABSTRACT

The escalation in the frequency of natural disasters due to climate change has augmented the loss in life, damage to property and destruction of environment. People at risk, mostly those in the developing countries with high poverty levels have been growing by 70 to 80 million per year which makes them more vulnerable to disasters. The floods and torrential rains in the country have not only damaged agriculture crops, livestock, fisheries, and forestry, but have also destroyed primary infrastructure such as tube wells, water channels, household storages, houses, animal sheds, personal seed stocks/fertilizers, various agriculture machinery and equipment and many more. It has been estimated that the agriculture sector has experienced overall damages of about Rs. 429 billion cropped agriculture being 89 percent of these damages and losses. The main focus of this research study is to analyze the economic impacts of floods on livelihoods of the local community at District Charsadda (UC Agra). Data was collected through structure questionnaire, survey and key informant interviews. The study explored the economic impacts of floods on livelihoods of UC Agra on agriculture, livestock's, property and businesses. Gaps were identified and based on the findings of this study, remedial measures for mitigating these economic impacts have been proposed. Finally, outlined recommendations need to be adopted in order to overcome the key challenges on the economic impact of livelihoods after a disaster strikes a community. For the sake of humanity, policy guidelines should be refined and implemented to improve the social and economic safety on a larger scale in future.

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LIST OF ABBREVIATIONS

| | |
|------|---|
| NDMA | National Disaster Management Authority |
| PDMA | Provisional Disaster Management Authority |
| HH | Households |
| DRR | Disaster Risk Reduction |
| FGD | Focus Group Discussions |
| SPSS | Statistical Package for the Social Sciences |
| UCs | Union Councils |

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INTRODUCTION

1.1 Introduction

Disaster occurrences are frequent throughout the world and large numbers of people are vulnerable to the risks associated with these disaster. Disasters are the outcome of a combination of hazard and vulnerability. When hazard hits a community with low vulnerability it might not become a disaster but when hazard strike a community with high vulnerability it result into disaster. Cyclones, Earth quakes, land sliding's, droughts and floods communities have witnessed disasters in the past and also suffered heavily in terms of millions loss of lives, injuries and economy (Aziz and Shaikh,2015) Floods are one of the most damaging natural disasters due to flood damages mostly occurring in urban areas, where most of the assets and population are concentrated.(Apel et al., 2016) Losses from floods annually destroy about millions of acres of crop land and affect hundred thousands of people along with a monetary loss in billions of rupees (Apel et al., 2016). Since 1970, the world has faced 969 riverine floods event and more than 89668 peoples were dead and approximately 336802377 US dollar was lost. (EM DAT)

Asia is the most flood-affected region, accounting for nearly 50% of flood-related fatalities in the last 25 years (Jonkman SN, 2005). Furthermore, in 2008 World metrological department/global water partnership, includes secondary impacts due to floods on short term pollution of rivers, hunger and disease, and displacement of persons who have lost their homes and disruption of livelihood, community breakdown, family blighted and reduced national gross domestic product. From 1986 to 1995 flooding accounted for 31% of the global economic loss from natural catastrophes and 55% of the casualties (Berz, 2000).

Pakistan is highly vulnerable to natural disasters. Floods are historically most frequently occurring disasters in Pakistan. From 1973 to 1993, only sixteen floods hit Pakistan but in the next twenty years, 54 floods of different intensity struck Pakistan (kreft,s et all 2015). It is ranked 7th in Global Climate Risk Index during period of 1997 to 2016(GCRI, 2017). Since 1970, Pakistan has experienced 41 riverine floods events resulting in 6188 deaths and more than 972.5030 million US dollar losses(EM-DAT, 2016). Flooding in the Indus, Kabul, and Swat

Rivers brought about the life loss of a huge number of individuals along with significant harm to settlements, infrastructure and agriculture sector near river banks.(Zehra & Afsar, 2016).

The effects of the flood in Khyber Pakhtunkhwa were highly severed. Infrastructure such as road, houses, and buildings was totally or partially damaged or destroyed. Loss of human lives and standing crops were damaged due to floods. According to Provincial Disaster Risk Management cell, 1109 peoples were injured and 1068 were found dead. Apart from that, 75 percent of the total population was forced to displace, 507423 acres of standing crops were completely destroyed during 2010 floods. (Haq,2011)

District Charsadda is one of the vulnerable district to floods and has experienced flood many times in past. The area is under risk of flooding especially during and after monsoon season(Sandhu, 2013). Floods generated mostly from the major rivers Kabul and Swat. The river kabul enter from the west of the district and flows sideways along southern periphery of the area (Khan et all, 2013), River swat and river Kabul are the major sources of flooding in union council Agra (Wahab, & Khan, 2010).

1.2 Floods in South Asia

Among natural disasters all over the world, floods are the most common ones. According to world statistics, 1.4 billion people were affected and around 100,000 were killed by the floods in 20th century. Each year, about 50-60 billion dollars are spent to address the needs arising from floods – a huge burden on the world economy. A United Nations (UN) study reports that ‘annually, floods claim 22,800 lives and damage to the Asian economy is estimated at around US\$ 136 billion.

About 25% of the world’s population lives in South Asia. The region’s land cover is 3.2% of the world’s land and 10% of Asia. The population in South Asia includes 40% of the world’s poor. The International Disaster Database (EM-DAT) indicates that 332 events of floods were recorded in South Asia during 1979 and 2005 alone. An advance search on the database reveals that in the last five years, 134 incidents of floods have occurred causing 13,795 deaths and injuring 7,973 people estimated 135 million people were affected. The detail can be shown in table 1 below.

Table 1: Natural Disasters in South Asia

| | |
|--------------------------------|-------------------|
| Occurrences | 134 |
| Deaths | 13,795 |
| Injured | 7,973 |
| Affected | 131,159,282 |
| Homeless | 3,971,716 |
| Total Affected | 135,138,971 |
| Total Damage ('000 USD) | 22,760,948 |

Source: International Disaster Database (EM DAT)

1.3 Flood in Pakistan

Pakistan after its independence has experienced flood disasters several times. Some important events occurred in 1950, 1956, 1957, 1973, 1976, 1978, 1988, 1992, 2010, 2011 and 2014 and 2016 (Annual Flood Report 2016). These floods caused damages in all the provinces of Pakistan. Floods of 2010 were considered as a most devastating flood of Pakistan history, it causes heavy damages to property, lives and even disturbed an entire infrastructure of all the provinces of Pakistan (Haq. 2011).

Pakistan has embraced various catastrophic disasters triggered floods. According to a report of the Asian Development Bank, Pakistan has experienced 21 major floods between 1950 and 2011 (almost one flood every three years) that claimed a total of 8,887 human lives and inflicted damage to 109,822 villages an estimated economic loss of \$19 billion. On an average, the annual flood damage from 1960 to 2011 was about one per cent of the annual Gross Domestic Product (GDP).

According to a report of Islamic Relief 71 floods occurred between 1950 to 2011. These caused the death of 14,866 persons whereas 58.97 million people were affected. These floods have a huge impact on an economy of Pakistan, as the total estimated damages accounted for around 12.46 billion USD. The detail can be shown in table 2.

Table 2: losses and Damages caused by Floods in Pakistan

| Year | Frequency | Death | People affected | Damages |
|--------------|-----------|---------------|----------------------|----------------------|
| 2010-11 | 4 | 2,113 | 20.35 million | \$9.5 billion |
| 2000-09 | 33 | 2,265 | 9.56 million | \$0.7 billion |
| 1990-99 | 14 | 4,180 | 15.18 million | \$1.09 billion |
| 1980-89 | 7 | 519 | 302,900 | 0 |
| 1970-79 | 5 | 2,066 | 13.38 million | \$1.17 billion |
| 1960-69 | 2 | 32 | 224,427 | \$3.3 million |
| 1950-59 | 6 | 3,691 | n/a | n/a |
| Total | 71 | 14,866 | 58.97 million | 12.46 billion |

Source: Islamic Relief Report 2011

1.4 Socio-Economic Impacts of Flood

Topographically and geographically Pakistan's Nature varies throughout the country. Like other countries in the world, Pakistan, is facing direct major losses from last few decades in economic sectors agricultural crops, property, bridges, buildings, roads, railway lines, and canals in billion dollars. Since 1970 Pakistan has experienced 41 riverine flood events. According to UN nation's report, Pakistan is rated as the facing greatest humanitarian crises in recent history other than the South East Asian countries. Pakistan's Flooding scenario is more than earthquake and other kind of disasters. Floods history (1950-2003) revealed that the loss of lives is approximately 6,082, affected 8,989,631 and 1.266 million villages affected. From 1994 to 1998, reported disasters average was 428 per year but from 1999 to 2003, this figure went up to an average of 707 disaster events per year showing an increase of about 60 per cent over the previous year's (Berz, 2000)

Flood 2010 directly affected an estimated 14-20 million people, and killed over 1,700. Nearly 1.1 million homes were damaged or destroyed, and at least 436 health care facilities were destroyed. The flooding caused \$9.7 billion in damage in forty-six of the country's 135 districts. Infrastructure losses were widespread including 2.9 million damaged households, of which 1.9 were severely affected or completely destroyed, and 80% of food reserves lost. The impact on

the rural economy, including agriculture crops, livestock, animal sheds, personal seed stocks, fertilizers, agricultural machinery, fisheries and forestry, was unprecedented (Berz, 2000).

1.5 Problem statement

Khyber Pakhtunkhwa was considered as a under developed province of Pakistan in terms of education, health, income, and living standards. It lies in the proximity of Federal Administration Tribal Area (FATA) that is why it has also been subjected to manmade disasters such as terrorism. Apart from this, it also encounters natural disasters such as floods, earthquake, and landslides. Floods are considered as most devastating disaster in term of losses. In District Charsadda, union council (UC) Agra is lying on the edges of river Kabul. UC Agra is the only UC where the flood is observed each year after 2010 due to its low lying topography and therefore, prone to flood. The population along the river has grown over the years. More than 26,000 people live in this area. Most of the population is engaged in agriculture. In addition, small scale livestock farming and fisheries is also source of income of community. The floods caused displacement of people from their usual dwellings resulting into varying impacts on lives, infrastructure, agriculture, livestock as well as damage to property. The study will explore and highlight the issues or reasons which cause adverse impact of floods on livelihoods. Based on the study findings, it will be easy to identify underlying causes of adverse floods impacts in the area and suggested remedial measures will help to reduce the economic impacts of floods on livelihoods.

1.6 Research Objectives:

The objectives of the study are:-

- a. To identify the economic impacts of flood on livelihoods of the local community at District Charsadda (UC Agra).
- b. To suggest remedial measures for mitigating the economic impacts on local communities living under similar conditions

1.7 Research Questions:

- a. What are the economic impacts of floods on the livelihoods of the local community of UC Agra?
- b. What are the policy issues in mainstreaming of DRR into livelihoods?

1.8 Scope

UC Agra community was selected for the study because the floods have become a recurrent Phenomenon over the years. The problem studied therefore was of societal concern because floods have negatively impacted the community. Despite the increase in frequency and magnitude of floods, no impact assessment study on the socio-economic livelihoods of the people has been undertaken to establish the underlying causes of their vulnerability. All the assessments undertaken have been carried out as a short -term response to the impact of floods. The study, therefore, will attempt to come up with recommendations and mitigation measures that will assist in dealing with the impacts of floods in the long term and sustainable manner.

1.9 Significance

This study provide information about economic impacts of floods on the community livelihoods and enable government and non-government organizations to take appropriate action during, before, and after a flood situation and help to reduce vulnerability in the study area. This research will also enhance the level of knowledge of readers related to flood risk management. More importantly, it is envisaged that the outputs of the study will be key inputs in the designing of sustainable mitigation measures to minimize the economic impacts of floods and the associated risks in community.

1.10 Organization of the Thesis

Chapter 1: INTRODUCTION

This chapter provides general idea, background, objectives, research scope along with the problem statement and the importance of the study about the national needs.

CHAPTER 2: LITERATURE REVIEW

This section is based on the review of relevant studies conducted in Pakistan and other parts of the world. The review of literature helps in understanding the research problems.

CHAPTER 3: METHODOLOGY

This chapter explains the research methodology adopted for the study. It explains the research design, research strategy, calculation of sample sizes, design of a research instrument, and finally the collection of data and data analysis technique.

CHAPTER 4: ANALYSIS AND DISCUSSION

This Chapter discusses the detailed statistical analysis for the data collected through the survey by using the SPSS software.

CHAPTER 5: CONCLUSION AND RECOMMENDATION

Describes conclusions drawn from the study and suggests remedial measures. The recommendations are based on the research findings and conclusion of the study.

LITRATURE REVIEW

2.1 Introduction

This chapter is based on the review of relevant studies conducted in Pakistan and other parts of the world. The review of literature helps in understanding the research problems. This chapter consists on detail literature review about flood hazard, vulnerability, and risk. This chapter includes base terminologies relevant to topic such as hazard, disaster, coping capacity, sensitivity, exposures, and vulnerability. Moreover, this chapter contains a comprehensive analysis of global demographic trends and resulting socioeconomic impacts of floods predominately in developing countries.

2.2 Disaster

The term "natural disaster" has been very frequently used in the past to refer to the occurrence of severe natural events such as tsunamis, earthquakes, volcanic eruptions, hurricanes, floods, landslides, among others, have been directly considered synonyms of disaster(Du et al, 2015). It can be further defined as any large scale phenomenon which disturbs the daily functioning of system. Hazard is a situation and disaster is the adverse outcome of such situation (Du et al, 2015). Disaster is the combination of hazard and vulnerability , disaster occurs when hazard hits the vulnerable elements at risk (Taubenböck et al., 2008).Within same community, everybody faces risk but some of them get adversely effected due to high vulnerability (Alwang, Siegel, & Jorgensen, 2002).

2.3 Vulnerability

Vulnerability is the amalgamation of sensitivity and exposure. Sensitivity may refer to the condition in which the community is unable to cope with disasters. It may be individuals, households or community (Sajjad & Jain, 2014) According to condition, it may be physical, economic, social, and environmental factors(Füssel, 2010)

Physical factors contributing to vulnerability, are fragile drainage structures, slum houses, fragile infrastructure(Sajjad & Jain, 2014). Social relations and vulnerable groups increase the disaster risk (Blaikie, Cannon, Davis, & Wisner, 1994). However, low literacy ratio, congested hoses

infrastructure and dependency ratio refer to social vulnerability (Sajjad & Jain, 2014). Similarly unemployment, poverty, limited access to resources are triggering factors of vulnerability (Blaikie et al., 1994). Unbalanced employment, financial crises are the contributing factors of economic vulnerability (Sajjad & Jain, 2014).

2.4 Flood

Floods are the most challenging disasters in all over the world. World-wide, no one can be exempted from the threshold frequency of a flood including developing countries like Bangladesh, India and Pakistan as well as developed countries like Japan, China, and America. Moreover impacts of Climate change further enhance the causes of flooding. The losses through floods are drastically increasing in current years.

Floods are the most costly and wide reaching of all natural hazards. They are responsible for up to 50,000 deaths and adversely affecting some 75 million people on average worldwide every year. It has been estimated that in India and Bangladesh 300 million people live in areas that are affected by floods (Nott, 2006).

Floods had several socio-economic and political implications which cause a wide range of complex issues. Some of the immediate consequences include the displacement of people, the destruction of infrastructure such as houses and roads, damage to farms and crops and loss of cattle and livestock. The destruction of roads and other infrastructure delayed on-going development initiatives and political processes (Theron, 2007).

Annually Pakistan experiences high catastrophic floods events. Heavy floods have occurred in Pakistan, India and china in summer of 2010 and in the south of America country of Columbia from October to December 2010. Australia also experienced such floods in summer of 2010 and 2011. The average degree of estimated effect caused by river floods in china in 2010 and 2011, where the total loss of 51 billion US dollars. In 2010, Mozambique, Namibia, South Africa, Uganda, Brazil, Mexico, United States, china and Pakistan were all reported to have floods casualties with destruction of life and property which also affected the economy. (Boudou & Lang, 2016).

2.5 Causes of Flood

2.5.1 Climate change

Hydrological hazards are on the rise in last twenty years. During last few years the climate change has been a serious contributing factor in flood risk (Shah,2017). As a result of climate change, the flood magnitude and frequencies have multiplied in last 30 years .The increasing rate of water runoff can trigger flood disasters in future, if possible mitigation measures have been neglected. Both perceived and scientific causes of flood events include heavy and prolonged rainfall, unusual movement of low pressure system, storm surges, failure of the dams and sedimentation in the riverbeds (Zoleta,2002).

2.5.2 Rain Fall

Exact forecasting of rainfall is one of the challenging tasks in weather predictions (Wang et al. 2010). Both prolonged and heavy rainfall can cause floods (Gupta & Sah, 2008). Pakistan has two notable rainy periods, monsoon from July to September and western depression from December to March. Thunderstorm and local convection are also partially contributing in dominant period. Himalaya region annual get rainfall between 760 mm and 1270 mm, which is approximate 72% of the mean annual flow in the Indus river system (Tariq,2012).

2.5.3 Deforestation

In addition to the natural causes such as climate change and rainfall, deforestation in the catchment area is the major intensifying factor of flood risk (Giri et al., 2011), .In upper catchment area. Deforestation and over grazing at an alarming rate is triggering the runoff process of riverine system (Khan and Atta-ur-Rahman 2006). Deforestation for the fuel purpose, growing rate of population settlement, cutting of forest for agriculture practices and supply of timber for financial purposes (Atta-ur-Rahman & Khan, 2013) are accelerating floods.

2.5.4 Encroachment

Parallel to the other human induced factors such as deforestation, encroachment toward water channel is also increasing flood risk (Giri et al., 2011), In KP the annually population is growing at a rate of 2.6%.The utilization of resources and demand for food and shelter is also increasing . As a consequence, continuous encroachment of the river channel for demand of agriculture or infrastructure are leading to floods (Atta-ur-Rahman & Khan, 2013).

2.5.5 Sedimentation

Sedimentation is a major problem in all riverine system of KP (Atta-ur-Rahman, Khan, Collins, & Qazi, 2011). However, the load of sedimentation is high for the Himalaya, Hindukush and Karakorum rivers due to the high agriculture activities in the catchment areas generating heavy sedimentation load in water channel, as a result reducing the capacity of water channels and increase the runoff(A. N. Khan et al., 2013).

2.5.6 Infrastructure

Fragile infrastructure accelerates flood vulnerability. Examples of Physical vulnerability such as slum houses, fragile infrastructure, solid waste disposal, exposure to hazards, and poor drainage systems are all such examples. While social vulnerability such as illiteracy, overcrowded houses (homes with more than three people sleeping per room) and children out of school, elderly population, and dependency ratio; whereas Economic vulnerability such as the migration of people for economic reasons, irregular employment, and very low income also exacerbate the flood impacts (Sajjad & Jain, 2014).

2.5.7 Lack of Awareness

A country like Pakistan, which is totally dependent on agricultural activities and has low literacy rate. Lack of awareness of the community to the risk of floods create huge problems and destroy a large amount of infrastructure, buildings, and increase in a number of casualties. Due to lack of awareness and safety precautions, the severity of flood increased and became a laborious job for government to handle it properly and efficiently (Houze Jr, & Romatschke 2011).

2.6 Causes of Floods in District Charsadda (KPK)

There are a number of causes of floods in district Charsadda such as rainfall, encroachment, lag-time, sedimentation, lack of awareness etc. Other meteorological and physical conditions are also responsible for floods in district Charsadda. Factors which contribute to flood occurrence are categorized into two different forms.

2.6.1. Climatological Causes of Floods

In Pakistan usually, floods are observed in monsoon weather. Monsoon starts in July till August. In these two months heavy rainfall is observed within a short span of time. So due to increase in water supply, it becomes quite a difficult job to accommodate water. But if water is not managed properly it may change into a flood and can destroy anything come in its path. Melting of snow in the upper areas such as Swat, Deer and Chitral also contribute in floods. Due to the melting of ice caps in these regions, the water level increased in river Kabul and river Swat which ultimately leads to flood (Dilley, M. 2006).

2.6.2. Anthropogenic Causes of Floods

In a context of Charsadda floods, human-induced activities also play an important role in flood generation process. There are particularly three most important anthropogenic activities with contributing in context of floods (Khan, R & Ayesha. 2010).

Firstly, intensive agricultural activities are observed in flood-prone areas. Runoff water carries sediments from agricultural areas and deposits them into drains and river bed. Due to this process, the storing capacity of the drains decreased and become shallow. So in case of heavy discharge, overflow of water may cause a flood. Secondly, Population density also plays an important role. Due to dense population Encroachment towards flood-prone area is observed. Rapid development in flood prone areas halts the flow of water. So water can also disperse or damages buildings in flood-prone areas. Thirdly, construction of narrow bridges throughout the drain at different locations also disturbed the natural flow of water. It may also cause flood (Houze Jr, & Romatschke, U.2011).

2.7 Exposure towards Flood Disaster

Flooding is a phenomenon that has negative consequences. A hazardous flood claims the lives of people and animals, disrupts their livelihoods and destroys roads, bridges, vehicles and houses. It may induce diseases, like dysentery, severe gastrointestinal outbreaks and Cholera outbreaks that need sophisticated medication (Messner & Meyer, 2006).

Flooding is one of the natural hazards which has the potential to transform into a massive disaster. During the past few decades, the world has experienced an increasing number of natural disasters and escalating losses from these events. The disruption to the road network also causes inflation of commodities price and affects the food distribution systems (Khan & Khan, 2008).

In addition to this, during the past few decades millions of deaths have occurred due to natural disasters such as earthquakes, floods, and hurricanes. The average loss of life has been about 150,000 and the financial loss exceeds \$ 50 billion per year (Messner & Meyer, 2006).

The direct impacts caused by river floods include: damage to property and crucial infrastructures, disruption to the livelihood and economic activities, threats to the lives of people and animals from possible drowning in deep water, contamination of drinking water supplies and shortage of food owing to destroyed crop fields and the loss of livestock's (Ashraf, et al., 2013).

The secondary effects due to floods disruption of systems and result in services. These effect also include short term pollution of rivers, hunger and disease, displacement of persons who have lost their homes and disruption of livelihood, community breakdown, family blighted and reduced national gross domestic product (Yawson et al., 2015).

2.8 Historical floods in Pakistan

Pakistan gets heavy rainfall in monsoon season and is highly exposed to floods due to its topography, climatic and ecological condition In Pakistan, the Himalayan range, receives a rainfall up to 760-1270 mm and land areas receive 200 mm. Pakistan is presently receiving 136 Million Acre Feet of water flow annually, and has experienced extensive losses in floods due to vulnerable factors like low quality of structure, fragile environment, poverty, lack of awareness and education, communication and weak early warning systems. Fourteen foremost flood events have been faced by country, since 1947. (Azam, Yussof, & Marwat, 2012), Pakistan constantly received flooding almost every year. Some of these floods take dangerous turn of becoming major natural calamity like that of flood 2010.

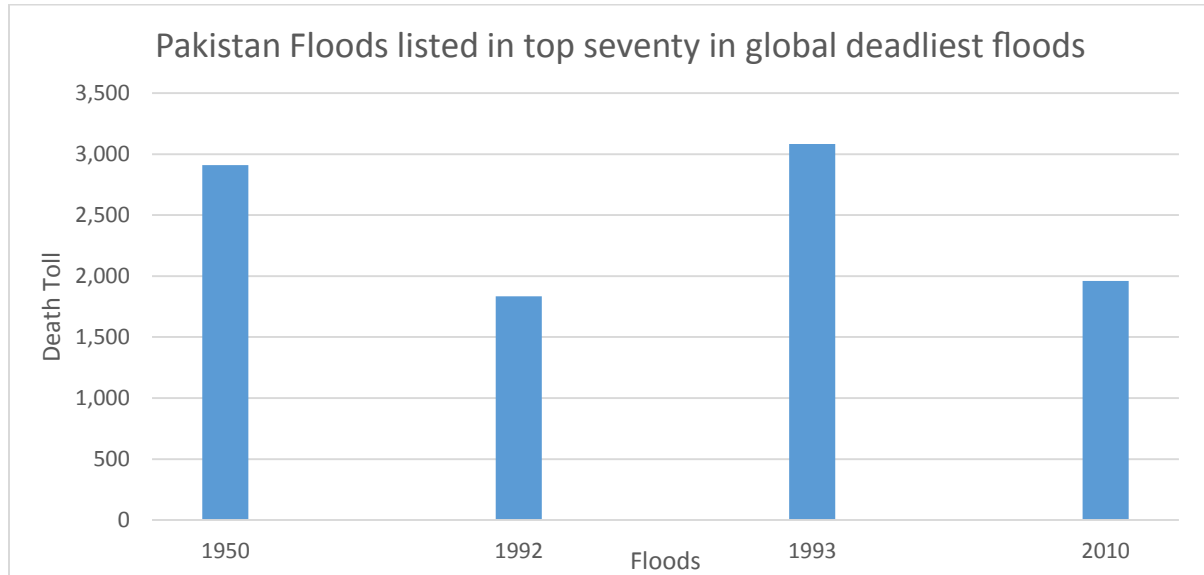
As explain earlier, Pakistan is vulnerable to flood, in past five decades Pakistan experienced many flood disasters and lost 2910 innocent lives of 2,910 citizen in 1950, 248 in 1977, 1,834 in 1992, 3,084 in 1993, 178 in 2003, 593 in 2007 and 1,961 in 2010-flood respectively, as shown in table 1 (Atta-ur-Rahman & Khan, 2013).

Table 1: List of Historical Floods of Pakistan

| Floods | Death toll |
|---------------|-------------------|
| 1950 | 2,910 |
| 1977 | 248 |
| 1992 | 1,834 |
| 1993 | 3,084 |
| 2003 | 178 |
| 2007 | 593 |
| 2010 | 1,961 |

Out of top seventy global fatal floods, four major floods disaster have occurred in Pakistan, including the flood of 1993 (ranked 41), 1950 (ranked 44), and 1992 (ranked 59), while that of 2010 (ranked 64) as shown in table 2.

Table 2:



2.9 Floods in Khyber Pakhtunkhwa

Khyber Pakhtunkhwa is the smallest province of Pakistan with an area mass of 9.4 percent of the country total area. It covers an area of 7452 sq.km and is located on both bank of river Indus and

stretches from Himalayas in the north to the deserts of Dera Ismail Khan to the south, where it shares boundaries with Baluchistan and Punjab province. 25 districts make up the province and further divided into 69 tehsils and 986 UCs. (PBS 2017)

There are two major river systems in KP. The Indus river, which forms the boundaries with Punjab and passes from Attock to Dera Ismail Khan in the south. Secondly, river Kabul flows from down to meet with river Indus from Afghanistan.

Rainfall in KP, occurs in two distinct crop-growing seasons, kharif which is in summer period (June-September) and Rabi which is winter period and it is between the month of December and March. Monsoon is generally experienced in the 1st week of the July. In this season, riverine floods that occur in river Kabul, Swat and Indus happen to affect the populated districts of central and western KP.

Floods in KP generally caused when it excessive downpours occur in the catchment area of River Indus, Swat and Kabul occurred in summer season, which are also triggered by snow melting. Major floods occur in late summer (July-September), when south Asian regions are subjected to heavy monsoon floods in the province. Almost every year frequent in monsoon, the province also suffer from flashfloods although there is no systematic records (PDMA, 2012)..

Floods have been occurring more than in the recent time due to change in climate and other weather conditions and are characterized by the absence of early warning covers to warn areas that are prone to flood hazards. These types of floods have been on the increase, due to change in climate. Its human resultant effects are the results of not enough early warning systems, lack of proper system for early warning and sudden nature of hazard. However, most of the regions prone to flashfloods lie outside the coverage of early warning system deployed for flashfloods. Flashfloods are experienced commonly in Swat, Upper Dir, Lower Dir, Chitral, Shangla (PDMA, 2012).

2.10 Study Area

Charsadda, located in the west of Khyber Pakhtunkhwa (KP) province, is 17 miles away from the provincial capital Peshawar. The district is surrounded by Malakand district on the north, by Mardan district on the east, Nowshera and Peshawar districts on the South and the Mohmand Agency of the Federally Administered Tribal Areas on the west side. The district lies in 71° 28' 13" to 71° 56' 12" east longitude and 34° 2' 53" to 34° 27' 34" north latitude (Smeda 2008).

Topographical feature of the district Charsadda includes of adjacent belt of high lying land and central plains called “ Doaba” and “Hashtnagar” are highly cultivated and irrigated (A. N. Khan et al., 2013). National Disaster Management Authority (NDMA) which is the apex body in Pakistan, has declared district Charsadda most vulnerable districts that are under risk of facing floods during and after monsoon season(Sandhu, 2013)

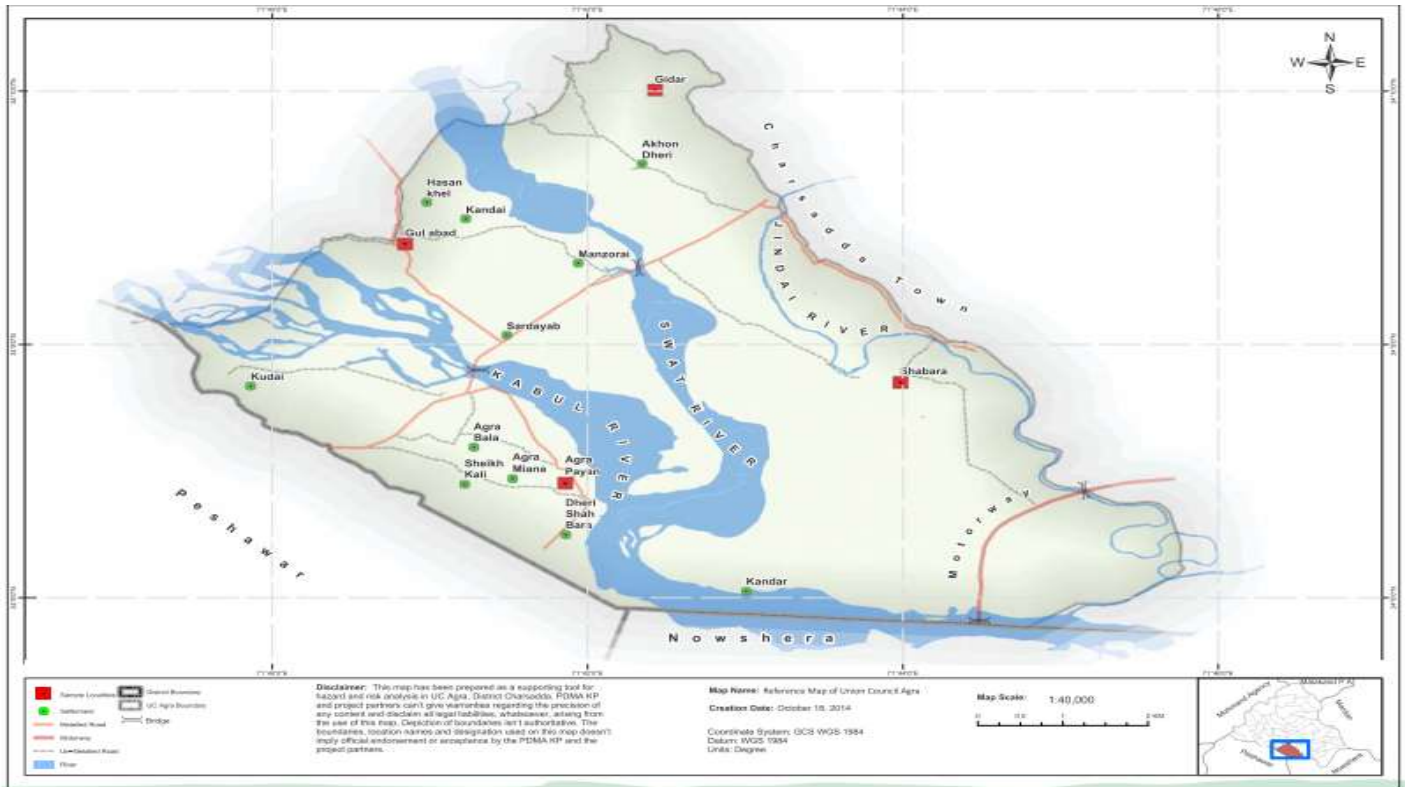


Figure 1: Map of district Charsadda and union council Agra (Source: Electronic Media).

2.10.1 Demography

As per census of 2017 district Charsadda has a total population of about 1.6 million with average growth rate of 2.44. District has both urban and rural settlement units. The total number of households are 221,058 , in which 183,437 are rural and 37,621 are urban houses holds.(PBS,2017). District Charsadda is divided into three tehsils, Charsadda, Shabqadar and Tangi. There are 46 union councils, out of which 22 are in tehsil Charsadda, and 12 each in tehsil Tangi and Shabqadar.

Union Council Agra is of the UC of tehsil Charsadda has total population of about 26284 and has 5229 number of households. Out of total population of Agra 6247 is male and 6811 is female

population. The number of children is 13199 which is about half of the total population and reflect the high vulnerability. Similarly other vulnerable groups are also present such 424 disables persons and 778 widows and also contributing in vulnerability (Village council Agra).

2.10.2 Hydrology

The major river Kabul enter from the west of the district and flow sideways by southern periphery of the area (A. N. Khan et al., 2013), River swat and river Kabul are the major sources of flooding in union council Agra.

Kabul River rises in the Sanglakh Range of Afghanistan, separated from the watershed of the Helmand by the Unai Pass. It is the main river in the eastern part of Afghanistan. It flows 700 km before joining the Indus River near Attock. It passes through the cities of Kabul, Chaharbagh Peshawar , Jalalabad, and (flowing into Pakistan some 30 km north of the Khyber Pass) Nowshera. The major tributaries of the Kabul River are the Logar, Panjshir, Kunar and Alingar rivers(Khan, & Ali, 2012). The depth to width ratio is highly variable at different places and in different seasons. There is no exact data available. However in Pakistan the depth varies from 6-10 feet and width from 100-300 feet approximately(Khan, & Shakoori, 2010).

2.10.3 Climate

The climate of the charsadda is divided into three seasons namely, the winter season which start from December and extend up, to April while the summer season from May to September and the other remaining months of year May, June, October, and November are the transitional period (A. N. Khan et al., 2013). Similarly, Monsoon occurs in summer season from July to September. Sustainable Development Policy Institute (SDPI) study show that with increase in Carbon dioxide (CO₂) emission normal precipitation in South Asia would increment between 17-59 percent. This can be connected with increase in the recurrence of high precipitation occasions and variable monsoon. Throughout the last 8-10 years the monsoon Impact has moved about 100 KMs westwards from the lower Kashmir districts to the Swat, Kabul and Indus catchments. Which results in flooding situation in these rivers (Rafi, 2001).

2.11 Floods in Study Area

Flood caused severe damages to the socio economic and physical environment(Weichselgartner, 2001) In 1996 heavy floods inundated local nallahs and drains which caused severe damages to the irrigation infrastructures, drains, settlements, land and crops in the districts of Mardan and

Charsadda(A. N. Khan et al., 2013), and UC Agra was also highly effected. Likewise, in 2010 floods 9,000 cusecs at Munda headwork's, which overflowed the levees and inundated the Charsadda plains flow passed and demolished the system while the extent of damages were physical, social economic, and life environment(A. N. Khan, 2013)

2.12 Floods Impacts

Borrows and De Bruin (2006) indicated that among natural catastrophes, flooding has claimed more lives than any other single natural hazard. In the decade 1986 to 1995, flooding accounted for 31% of the global economic losses from natural catastrophes and 55% of the casualties. The damaging effects of flooding are likely to become more frequent, more prevalent and more serious in the future (Borrows, 2006).

Zahiran, et al. (2008) observed that floods are the most of hydro-meteorological disasters in the United Sates. According to data from the Spatial Hazard Events and Losses Database for the United States (SHELDUS), floods claimed the lives of 2,353 people from 1970-2000. Over this period, fewer people were killed by hurricanes, tropical storms and tornados combined. In support of this observation, the Federal Emergency Management Agency (FEMA) estimated that flood events were responsible for the death of more than 10,000 people in the US since 1900.

The study undertaken in Texas established that socially vulnerable populations suffer disproportionately in terms of property damage, injury, and death as a result of physical impacts of disaster. For reasons of economic disadvantage, low human capital, limited access to social and political resources, residential choices, and evacuation dynamics are the social factors that contribute to observed differences in disaster vulnerability and economic class. (Zahiran, *et al*, 2008).

Smith and Ward (1998) argued that direct losses to floods occur immediately after the event as a result of the physical contract of the flood waters with humans and with damageable property. However, indirect losses which are less easily connected to the flood disaster and often operate on-long time scales, may be equally, or even more important. Depending on whether or not losses are capable of assessment in monetary values, they are termed tangible and intangible. Indirect and intangible consequences of flooding are probably greatest in Least Developed

Countries (LDCs), especially where frequent and devastating floods create special impacts for the survivors.

The impact of disasters is usually measured in quantifiable ways, such as adding up the number of the dead and injured, and estimating the physical damage to housing, land, livestock, agriculture, stores and infrastructure. But attention is not necessarily paid to how disasters impact on different categories of people, men, women, children, aged people, etc. Disasters affect men and women differently because of the different roles they occupy and the different responsibilities given to them in life and because of the differences in their capacities, needs and vulnerabilities. Family size may change at household level due to disasters. For example in Chitwan district, Nepal during the floods, the extended family system collapsed, leaving the women and elderly without support (Ariyabandu and Wickramasighe 2005).

A study carried out in 2005 in Southeast Bangladesh confirmed the positive relationship between environmental risk, poverty and vulnerability. Poorer segments of society live closer to the river and therefore face a higher risk of flooding and are thus more vulnerable. Environmental risk exposure also goes hand in hand with income inequality and access to natural resources (Brouwer, et al.2007). Families living nearer to the river seem to have fewer opportunities to engage in multiple economic activities which make them more vulnerable to natural disasters and may keep them trapped in a vicious poverty cycle (Brouwer, et al.2007).

Asia is struck by 70% of all floods in the world and the average annual cost of floods over the past decade is approximately 15 Billion USD. Economic losses and impacts have remained high and constitute a large developmental burden. They suggest that there is a need for new types of strategies in order to cope with the financial burden from hazardous events. One of the largest deltas in Vietnam is seriously threatened by floods. Lives and property are threatened by annual flood events which impose a substantial burden on the community. Vietnam has experienced increased flooding due to its dense and increasing population and its location in a low land (Hanson, *et al* 2007).

According to Mustafa (2002), despite Pakistan's massive investment in its water sector, it still remains vulnerable to the flood hazard. Pakistan suffered major floods in 1950, 1956, 1973,

1976, 1988 and 1992, each affecting more than 10 thousand lives. The 1992 floods cost the country more than 3 percent of its total GDP. According to the study undertaken in four villages in Central Pakistan, the people attributed their vulnerability to floods to poverty, God's will, socio-economic powerlessness and Government (Mustafa 2002).

Amir Nawaz and coauthors (2012) discussed damages and causes of flood in Hissaran dhari Village community. They explained that a slum area which consists of houses has been constructed from mud and stone is more vulnerable to floods. They also concluded that damages occurred in area due to unplanned land use and lack of awareness.

2.12.1 Impacts on People and Communities

Deep, fast flowing or rapidly rising flood waters can be particularly dangerous. For example, even shallow water flowing at 2 meters per second (m/sec) can knock children and many adults off their feet, and vehicles can be moved by flowing water. The risks increase if the floodwater is carrying debris. Some of these impacts may be immediate, the most significant being drowning or physical injury with the danger of being swept away by floods. Floodwater contaminated by sewage or other pollutants is particularly likely to cause illnesses, either directly as a result of contact with the polluted floodwater or indirectly as a result of sediments left behind (Gormley and Mansergh, 2009 ; Reddy and Danssie, 2014)

Flood impacts vary with vulnerability of different group. According to a study carried out at Institute of Local Government Studies (ILGS) and International Water Management (2012), women were responsible for protecting the little ones, directing and carrying the floodwater from the rooms, ensuring there is food in the home and importantly taking care of those who get ill after the floods. Children were identified as the worst impacted vulnerable group. Most of the children had to depend on their parents or older siblings to survive during and after flooding. The most significant impact of flooding on children was disruption of their education and deteriorated health condition (Tariq & van de Giesen, 2012).

2.12.2 Impacts on livestock

The flood also results in loss of livestock like goat/sheep, chicken, buffalo, cow/oxen etc. As the animal husbandry is the second largest income of livelihood after agriculture, drowning of some of the livestock and deaths by flood of many others from unidentified diseases after the flood had an impact on the livelihood of the people. While chicken suffered maximum health related

problems, livestock suffered the food crisis in floods. The food crisis of the livestock was one of the major problems during floods (Reddy & Danssie, 2014).

In one of the study during flood time, the livestock suffered from different types of health related problems very frequently, and it was very difficult to manage the medical service for sick livestock in such situations. Sometimes, these cattle needed to be shifted at animal hospital far from the locality which was very difficult (Karley, 2009).

2.12.3 Impacts on Property

Flood hazard that may lead to deaths and reduce the asset base of households, communities and nations by destroying infrastructure, machinery and buildings. The intensity, duration and distribution of rainfall in the catchments, all influence the magnitude of the resultant floods. The amount of damage caused by a flood depends on a range of factors, including its magnitude, speed of onset and duration. In the context of the Ethiopians, Cortaid and International Institute of Rural Reconstruction (2011), revealed that flood killed 862 people, and the economic damage was close to 3.2 million USD in 2006 in Ethiopia (Terry Cannon, 2008; Adger, 2003).

In addition to this, flooding often damages public infrastructure such as bridges, roads, schools and water supply systems. Also common is the collapse of dwellings, especially in rural areas where dwellings are built of mud and often lack proper foundations. As the water rises up from the soaked ground, the bricks are weakened, causing the walls to collapse (Karley, 2009).

Pakistan floods in 2010 caused extensive damage to schools and health centers. Beside this, 7,600 health facilities required rehabilitation in which 436 health facilities were damaged or destroyed, greatly limiting the provision of health care services to the affected communities (WFP, 2010). In addition to this, flood incidents resulted into great loss to communities, ranging from loss of property to human lives (Cuny, 1991; Wieslander, Norbäck, & Venge, 2007; Khan & Khan, 2008 ;Looney, 2012).

METHODOLOGY

3.1 INTRODUCTION

Detail literature review was carried out in pervious chapter, this chapter deals with discussions on research methodology, sampling techniques and data collection process. This research is comprised of two steps. The first step is to highlight the economic impact of flood on livelihood. The second step is to suggest remedial measures for mitigating the economic impacts. Both primary and secondary data were collected. The primary data was collected directly from the field using questionnaire while secondary data was collected from various journals, reports, books, research articles, database, and relevant departments.

3.2 Study Area

The area of study is a low lying and situated near the River Kabul. In 2010 floods, almost all the districts of KP were damaged completely or partially. Union council Agra of district Charsadda is the only UC where the flood is observed each year after 2010 at small or large scale. The main crops of UC Agra are sugarcane, wheat, maize, tobacco and vegetables. Agriculture is the main source of livelihood. Secondary source of livelihood is livestock, small business, labor services and few numbers of households are involved in government and private jobs. Total population of UC Agra is 26,000(PBS, 2017). The numbers of household are 3800.

3.3 Research Design

The study will use a mixed methodology; both quantitative and qualitative techniques will be used, to avoid common method bias. Qualitative data collection methods often employ measuring instruments. Measurements refers to the process of describing abstract concepts in terms of specific indicators by the assignment of numbers or other symbol to the indicators while in qualitative research, the researcher's choices and actions will determine the design or strategy. As stated above, the study employed both quantitative and qualitative approaches.

3.4 Research Techniques

The layout/design through which researchers conduct their study to attain and answer intended research problem is termed as research strategy (Saunders et al., 2003). It comprises of sampling and questionnaire development, data collection sources and considering research constraints. The research strategy is selected on the basis of research aim/objectives. This study is descriptive by quantitative method primary data which is collected through questionnaire, whereas the validity of questionnaire and reliability of data is checked using SPSS.

3.4.1 Preliminary Questionnaire

After a comprehensive literature review, a preliminary questionnaire was developed. The items of questionnaire were adopted from the studies carried out by Yande (2009). The study carried out by Yande investigates the socio economic impacts of floods on livelihoods of people of Sikunze community of district Kanungula of Zambia. The study highlighted the socio economic impact of floods on livelihoods and critical aspects such as agriculture, health, education, housing, water and sanitation and property and assets.

3.5 Questionnaire Finalization

Shuwei (2009) suggested that the survey questionnaire should be clear, precise and attractive for the respondents to fill in and return it. In this research, the questionnaire was developed in easy and understandable form and also keeping in view the physical environment and social scenario of UC Agra of district Charsadda. The adopted questionnaire was only about the impacts of floods and questions about the financial constrain and recovery was also added. Initially preliminary questionnaires were sent to be randomly selected respondents and related experts. The purpose of this preliminary survey was to get observations, feedback and suggestions regarding modification to formulate the questionnaire for final survey. On the completion of this initial survey the data was collected, and necessary amendments were made on its basis.

Each question consists of respondent's attributes about the Households demography, livelihood pattern, impact of floods on Agriculture, livestock, houses, property and assets, and business. Finally, some questions were asked about the financial recovery and support during and after floods. The questionnaire is attached as Annex 'A'.

3.6 Quantitative Household Questionnaire

According to Babbie and Mouton (2001), the basic objective of a Questionnaire is to obtain facts and opinions about a phenomenon from people who are informed on a particular issue. Questionnaires are probably the most generally used instrument of all. In this particular study, primary data was obtained by directly talking to the interviewees at household level so as get very reliable and accurate information. Primary Data was therefore collected through personal interviews and Focus group discussion at UC Agra community.

The household questionnaire covered the following topics: -

- Households Demography
- Livelihood Pattern
- Impact of Floods on
 - Housing
 - Property/Asset
 - Agriculture
 - Livestock's
 - Business
- Financial support/Recovery

3.7 Qualitative Key Informant Interviews

The interviews were held with key informants using a checklist at both district and community levels. The composition of key informants comprised of all critical players that have a role to play in the management of floods. Some notable organizations and individuals at district level included the following:

- Local Government office of Charsadda
- Village council of Union Council of Agra
- Union council Agra Nazim
- Local Non-Governmental Organization
- Agriculture Department of Charsadda

3.8 Data Sampling Procedure

As per census of 2017 district Charsadda has a total population of about 1.6 million with average growth rate of 2.44 per year. Districts have both urban and rural settlement units. The total number of households are 221,058 , in which 183,437 are rural and 37,621 are urban houses holds.(PBS,2017). Union council Agra was selected purposely because union council Agra has experienced flood many times in past and one of the most flood effected area of district Charsadda. The union council Agra has a total population of about 26000 and 3800 number households(PBS, 2017).

3.8.1 Determination of Sample Size

To select an appropriate sample size different methods and formulas are available in the literature(Morse, 1991). Here the population of the study is finite; Yamane (1967) sample size formula will be used:

$$n = \frac{N}{1 + N(e)^2}$$

Where, n=Sample size

N= Size of population

e = the error of 5 percent point

Therefore using the Yamane formula we get sample size of our study

The total Population of union Council Agra is 26000 putting the value in formula we get sample size

$$n = \frac{26000}{1+26000(0.05)^2}$$

n= 399

So a random sample of 399 household is the desired sample size which should be enough to give us the desired results. Out of the total questionnaire distributed among the households we received 379 responses.

3.9 Data Collection

Both quantitative and qualitative methods have been used for following inclusive research process. Data was collected for this study by using both primary and secondary data collection techniques.

3.9.1 Primary Data

Primary data has been collected through questionnaire, survey and FGD, and interviews. Questionnaire was prepared to collect the primary data. The questionnaire was prepared on the basis of the objectives of the study. Sample size of the study was 399 among the distributed questionnaire 379 questionnaire was received from the respondents. The response of the respondent was shown in the table 3.1.

Table 3.1 Response rate of Questionnaires

| | |
|------------------------------|------------|
| Questioned Dispatched | 399 |
| Response received | 379 |
| Response Rate | 95% |

3.9.2 Focus Group Discussion (FGD)

Three focus group discussions were held with Agra community in three different locations. In which the total number of participant was 35. The community was asked open ended questions in related to research objectives. The questionnaire is attached as Annex 'B'.

3.9.3 Secondary Data

Secondary data is essential for conducting research, for understanding the position of disaster on local area and its impacts on different sectors like agriculture, property and business. Secondary data has been collected by detailed literature review. Secondary data was collected from different journals, reports, articles, online database, books, and relevant department.

3.10 Statistical Tools for Data Analysis

SPSS (Statistical Package for the Social Sciences) software was used for carrying out the statistical analysis of the collected data. The descriptive analysis techniques were applied separately on the responses according to the need of the objectives. The SPSS software has been used as the main data compilation and analysis tool in this research study. The data was entered into the SPSS software version 20 for all the questionnaires and compiled accordingly so as to make it ready for necessary analysis.

3.11 Research Process

Both quantitative and qualitative methods have been used for following inclusive research process. The research has been conducted under a Social Exploratory method. Firstly, data has been collected from online data base and detailed literature review about disastrous impacts of study area, economic impact of floods on livelihoods of Community and questionnaire was developed based on previous studies. Both primary and secondary data sources were used in study, the primary data were collected through questionnaire and secondary data were collected through detailed literature review. The data has been analyzed on SPSS and result was interpreted in form of tables and graph for achieving the research objective .Interviews were conducted with relevant organizations while the data of the interviews was used to recommended structural and non-structural remedial measures, which will address the vulnerabilities of the local community.

3.12 Flow Chart Showing Study Process

The research has been conducted under a Social Exploratory method. The first step is explorations, problem has been identified by detailed literature review and questionnaire was developed base on pervious study. Both primary and secondary data sources were used in study, the primary data were collected through questionnaire and secondary data were collected through detailed literature review. The data have analyzed on SPSS result was interpreted in form of tables and graph for achieving the research objectives.

The following Figure 3.2 presents the flowchart of research methodology and the proposed statistical methods used in this study.

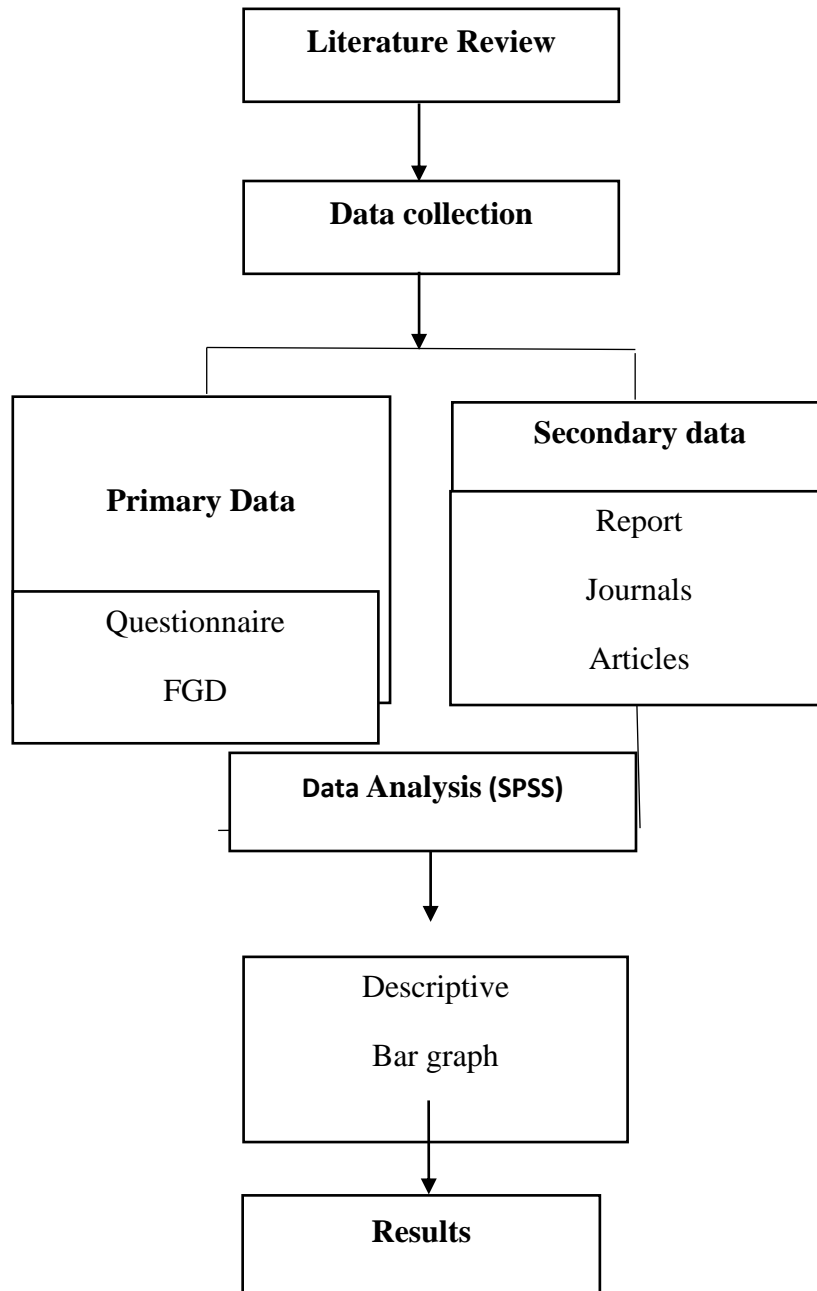


Figure 3.2: Flowchart of Research Methodology and Proposed Statistical Methods

Analysis and Interpretation

4.1 Introduction

This chapter provides a detailed discussion and analysis of the research, based on the primary and secondary collected data. The data was entered in Statistical Package for Social Sciences (SPSS) version 20 for analysis. This analysis is based on the discussion of the Household demography and impact of flood on livelihoods of union council Agra community i.e., Agriculture, Livestock, Property and Business. Furthermore, it also discusses the financial support provided by the different organizations and families during flood.

4.2 DEMOGRAPHIC DESCRIPTION

4.2.1 Gender of Household Head (H.H)

In this research study, data was collected from a total of 379 respondents of households of Agra community by interviews and focus group discussions (FGDs). The pie graph shown in fig 1 below shows the segregation of male in blue and female in green. It shows that data was collected from 342 male respondents which forms 90.2% of the total respondents while 37 (9.76%) were female respondents. The figure show that majority of the households are male respondents.

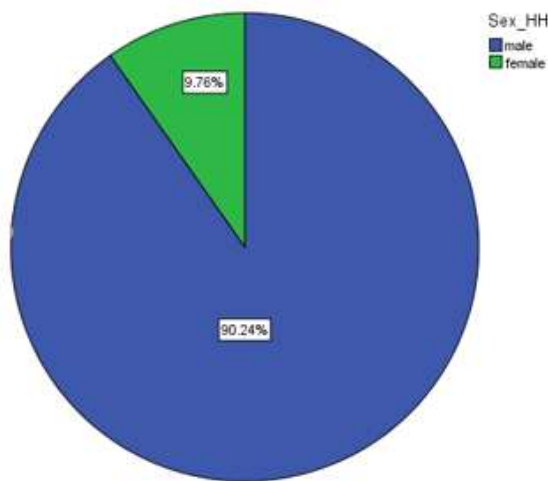


Figure 4.1: Gender Wise Demography of the Households

4.2.2 Age of the Respondents

Fig 2 represents the age of the respondents who participated in this study. The result of the study shows that 169 respondents were aged 41-59 years which is 44.5% of the total respondents. In the second level, 133 respondents, which sum up 35%, were in the age group of 21-40 years. Below age 20 category, there were 11.8% respondents and in the category of aged above 60 years were 8.4%. The overall analysis of fig 2 indicates that most respondents were matured participants who appeared during the survey.

The mean 2.496 shows that most respondents who were surveyed were laying between category 2 and 3. Category 2 is for age between 21-40 years and Category 3 is for age between 41-59 years. The standard deviation with value 0.8112 means that the data is low variant from the mean 2.496.

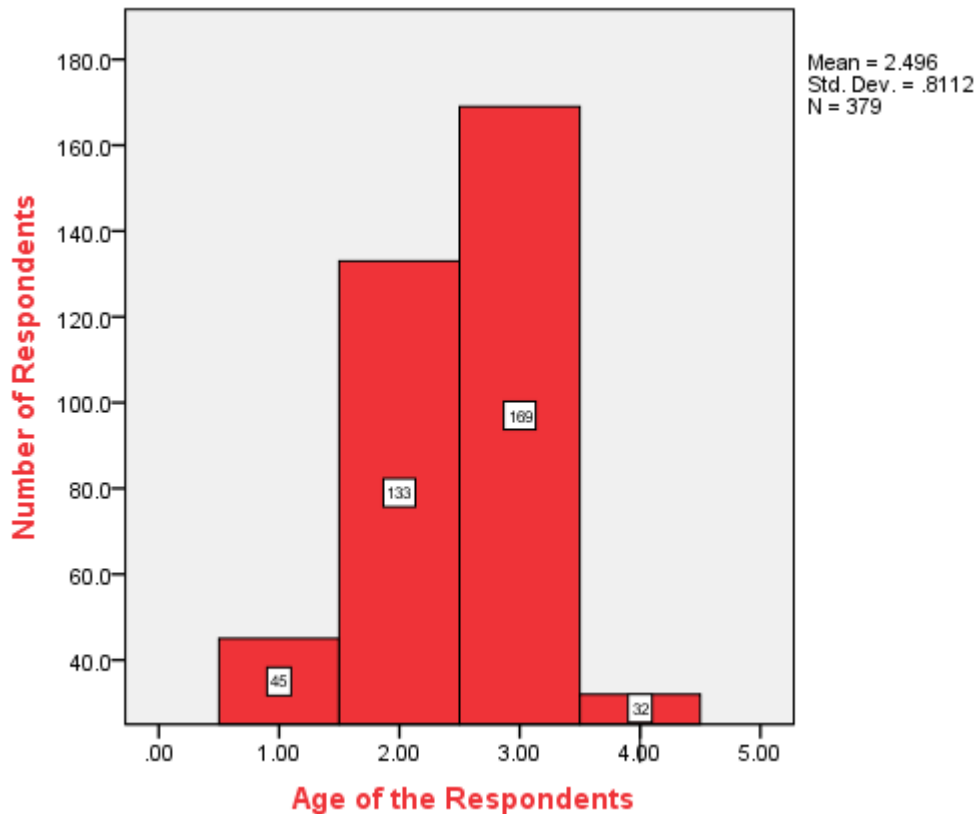


Figure 4.2: Age of the respondents

4.2.3 Marital Status of the Respondents

Figure 4.3 shows the marital status of the respondents. According to the figure 4.3, 68% of the respondents were married followed by single 19%, while 6.07% were widowed and 5.80% were divorced. It shows that the major respondents of the study were married.

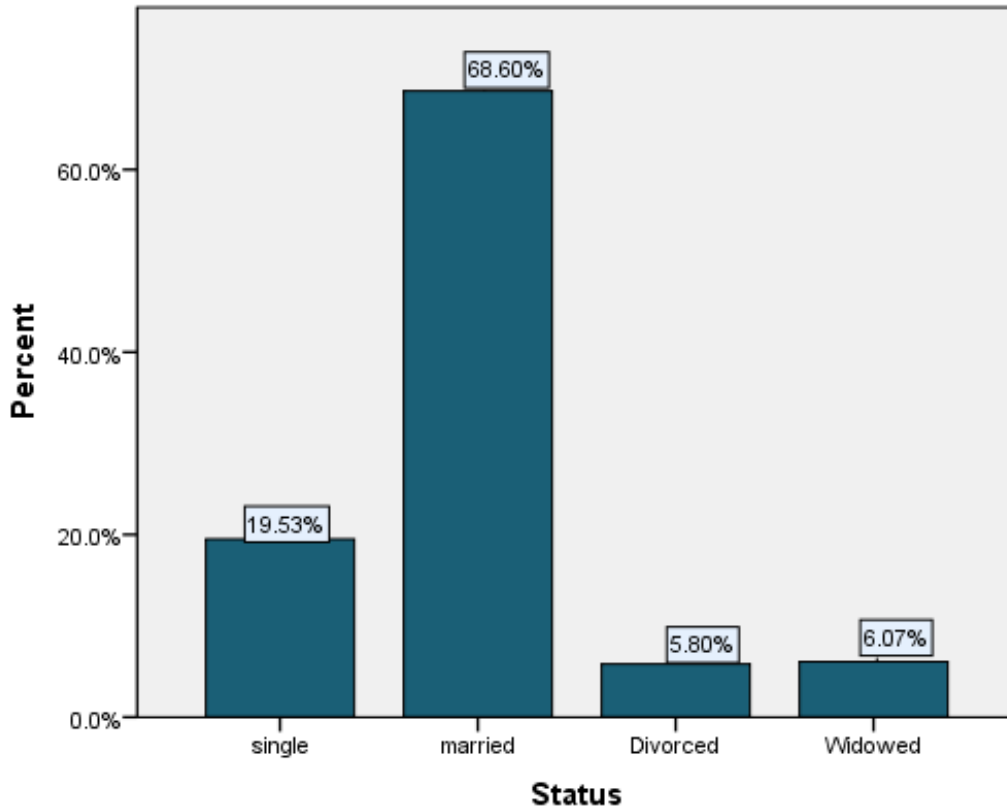


Figure 4.3: Marital Status of Respondents

4.2.3.1 Households Size Respondents

The figure 4.3 a revealed that the size of households was between 7 to 10 persons (45%) followed by 5 to 7 persons (38%) and 3 to 5 person (17.5%). This show that the average households size of the Agra community is 8 people per house. The detail is shown in figure below

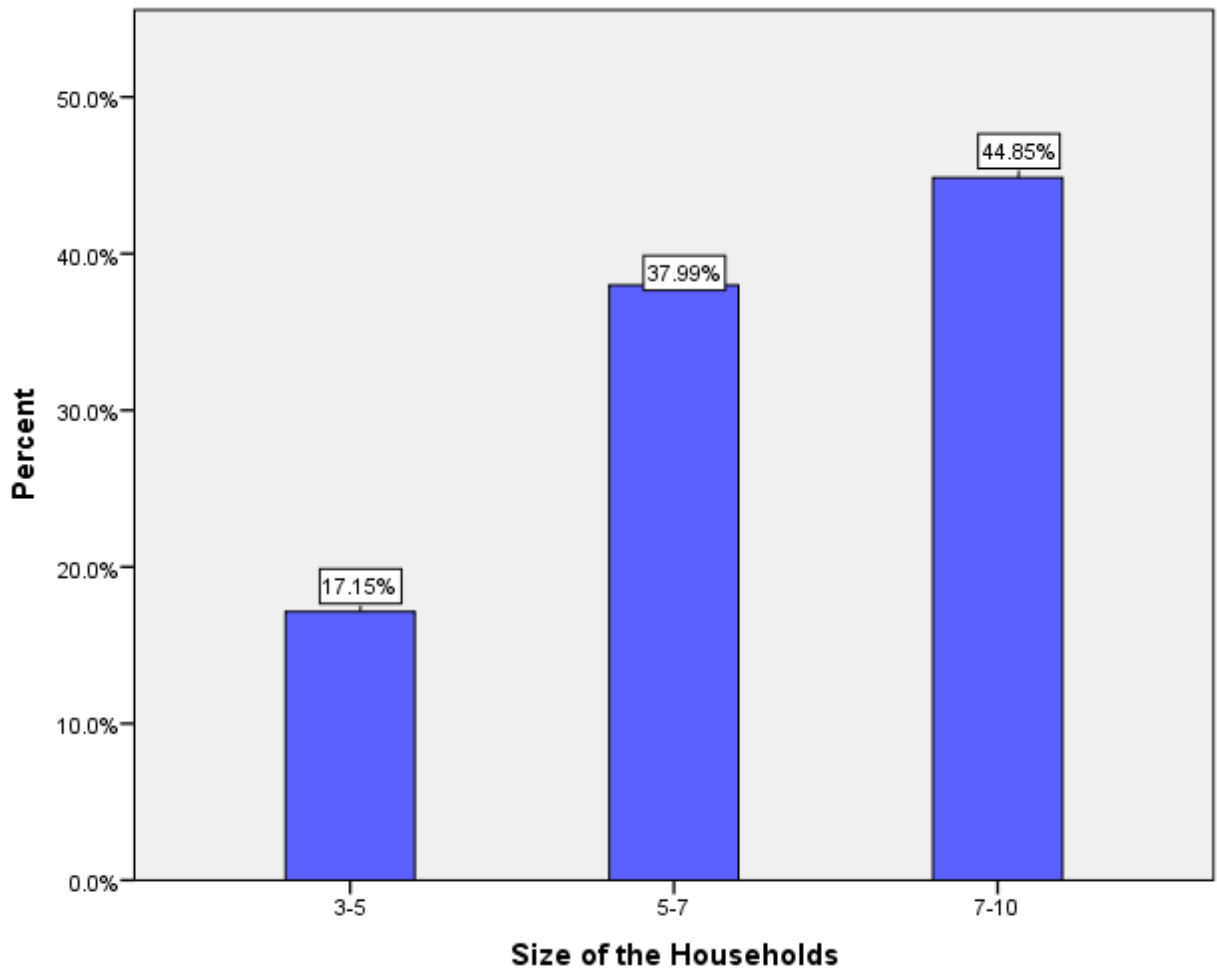


Figure 4.3 a: Household size of the Respondent

4.3 Livelihood Patterns

The figure 4.4 revealed that the most important livelihood sources of the Agra community were crop production which is 69.05 %, followed by livestock with 14.81%, Wage Labor 10.58%, Fishing 3.70%. Discussions held with community respondents reveals that the main source of income for the most households was crop production followed by livestock production. The 1.85% of the households is also engaged in government and private jobs, while some of the households are working aboard in Middle East.

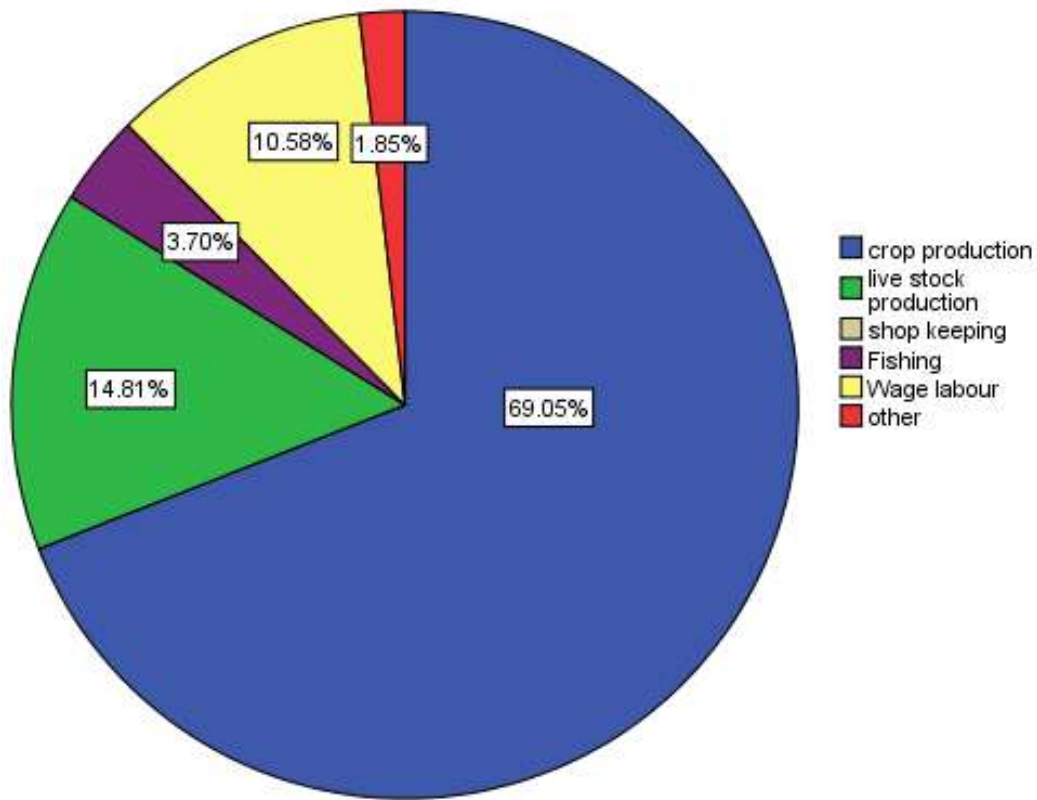


Figure 4.4 Comparative Analysis on the livelihood Types of Households

The analysis shows that the Agra community major the livelihood source is agriculture. 69.05% of households are engaged in agriculture activities as most of them indicated to have minimal available secondary livelihood sources. The other main source of the Agra community is livestock production and wage labor while some of the household are engaged in jobs.

4.4 Flood Impact

4.4.1 Agriculture

In fig 4.5, 92.08% of the respondents said that crop was damaged by the floods in which male respondents were 84.43% while female respondents were 7.65%. However, 7.91% respondents revealed that their crops were not affected by the floods in which 5.80% male and 2.11% female expressed their opinion. The detail of the respondents is shown below in Figure 4.5.

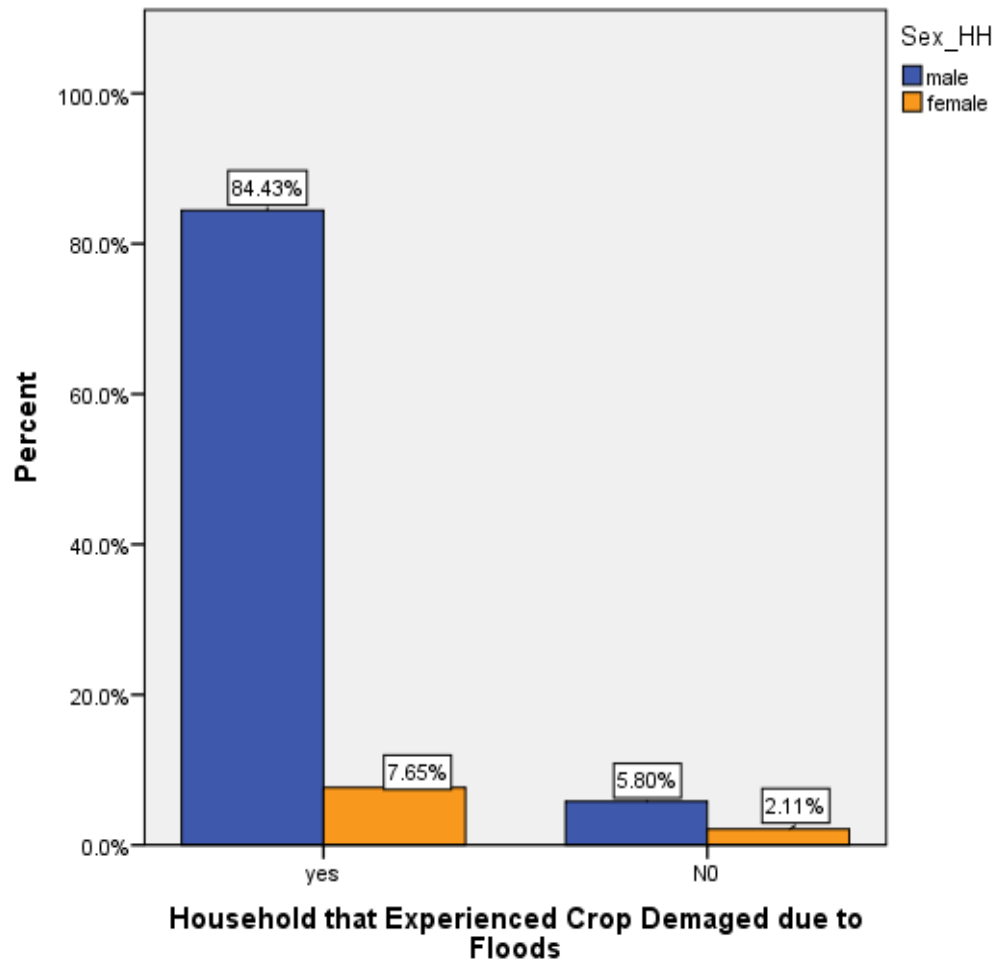


Figure 4.5: Households that Experienced Crop Damages due to Floods

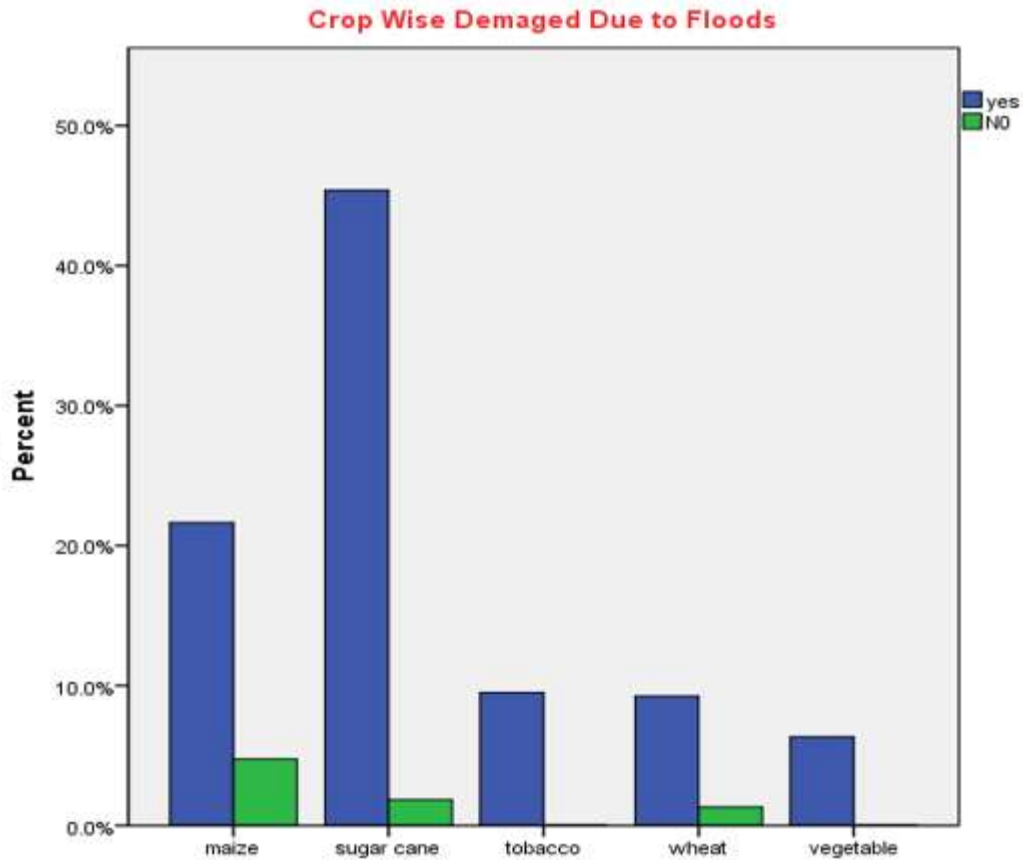


Figure 4.6: Crop wise damaged due to Floods

Agriculture is the major livelihood source of the people in UC Agra. It is highly fertile area in Charsadda irrigated by Kabul River as shown in fig 4.6. Major crops of the study area are Sugarcane, Maize, Wheat, tobacco and vegetable. This study found that crop production is the main source of their livelihood and most of the community depends on the production of the crops. It is also evident that sugar cane which is the main stable crop of UC Agra, was badly damaged by flood and constitutes 45% of the damage, followed by Maize 21%, Tobacco 9%, Wheat 8% and vegetable 6% respectively.

The study also revealed that (65%) of the respondents informed that they lost their stock food due to floods. The stock foods include the store grains and other food items due to which they had to depend on Governments and NGOs, while (35%) of the households revealed that did not lose any food items during floods, as shown in figure 4.7 below.

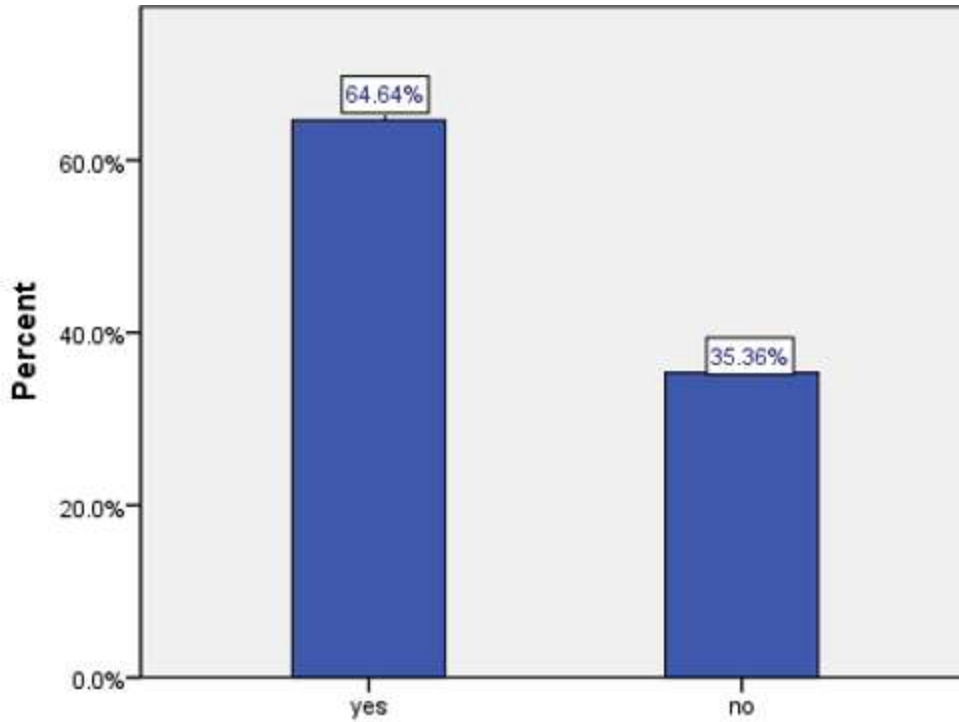


Figure 4.7: Food stocks loss due to Flood

4.4.2 Housing

Among the three hundred seventy-nine sampled households, 72% indicated that their houses got damaged due to floods. The discussion with community revealed that most of the houses are made of mud while some of the houses are pakka. Furthermore, within the number of households who indicated that their houses got affected by floods, 71.77% were male headed household and 5.54 % were female headed households, 18.47% male headed and 4% female headed households stated that their houses were not affected as shown in fig 4.7 below.

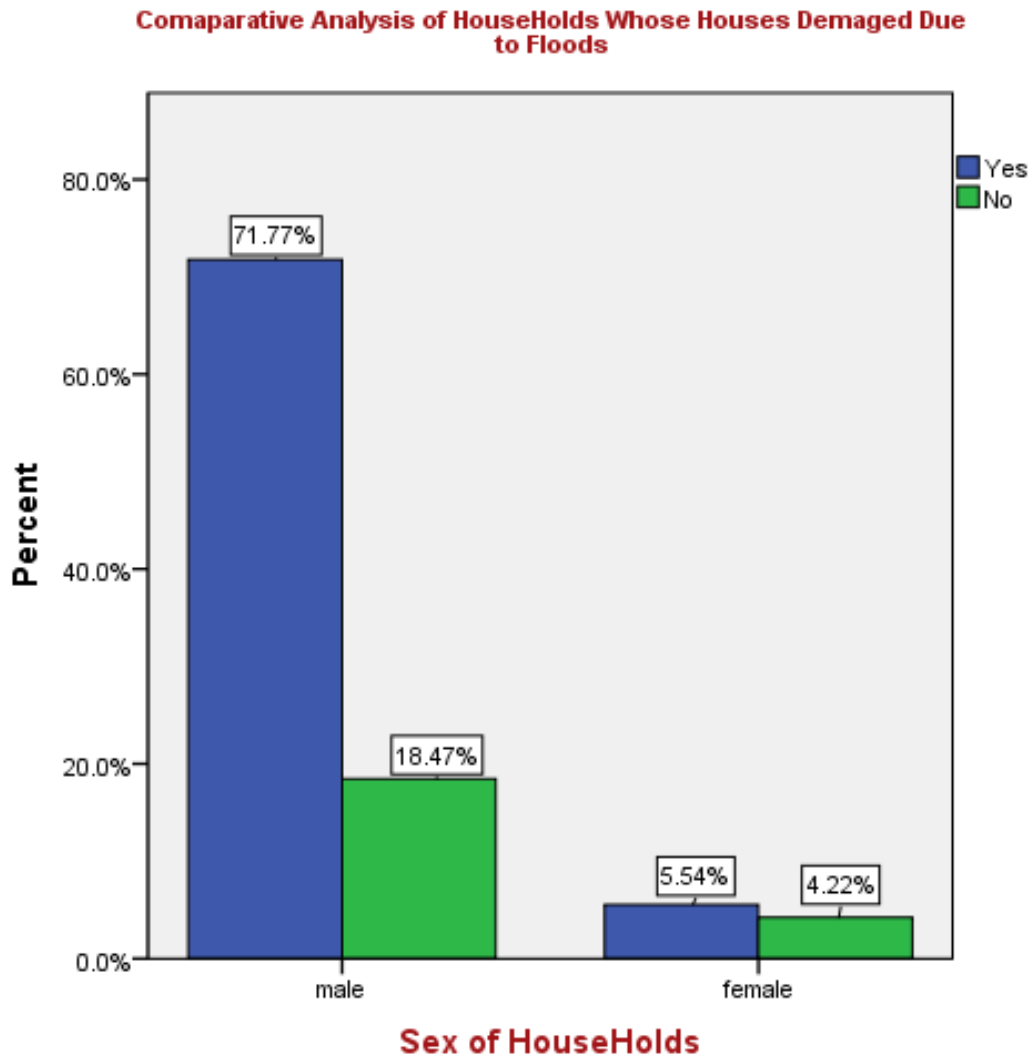


Figure 4.8: Comparative Analysis of Houses Damaged Due to Floods

4.4.2.1 Households Displacement Status

The results of study revealed that due to floods households of UC Agra were temporarily displaced to other areas. During discussions with the community, they mentioned that most of the people evacuated to their relative homes and the rest took shelter in Hujras, Masjids and Government schools of Charsadda. The detail of households who were displaced during flood is shown in table 4.1. It is evident that a total of n=233 (61.88%) households were displaced due to flood. Further, the result showed 38.52% (n=146) of the households stayed at their own homes.

Table 4.1: Percentage Distribution of Households of UC Agra

| | | N | N% |
|------------------|------------|-----|--------|
| Displaced | Yes | 233 | 61.88% |
| | No | 146 | 38.52% |

The same result is also shown in below figure 4.9

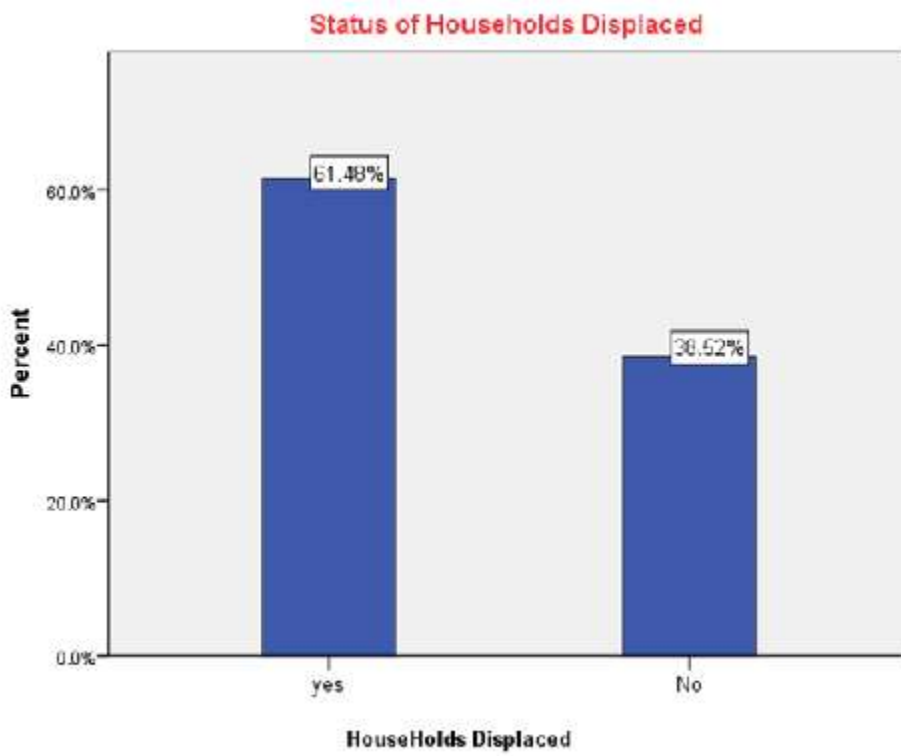


Figure 4.9 Status of the Households Displaced

4.2.3 Property and Assets

The finding of the study revealed that 37% of the household's loss their livestock due to flood. Out of the 37%, 19% were cattle's like sheep and goats and 18% of household's loss their cow due to flood. Other than livestock the UC Agra community lost their housing productive items like furniture 11.30% and Ox cart 12.33%, 9.59% households revealed that they lost their important documents like property deeds, educational documents, 6.51% claim that they lost their jewelry, while another 4.11% of the household indicated they lost other property like clothes, blankets and utensils etc. The detail of these are shown in Figure 4.10

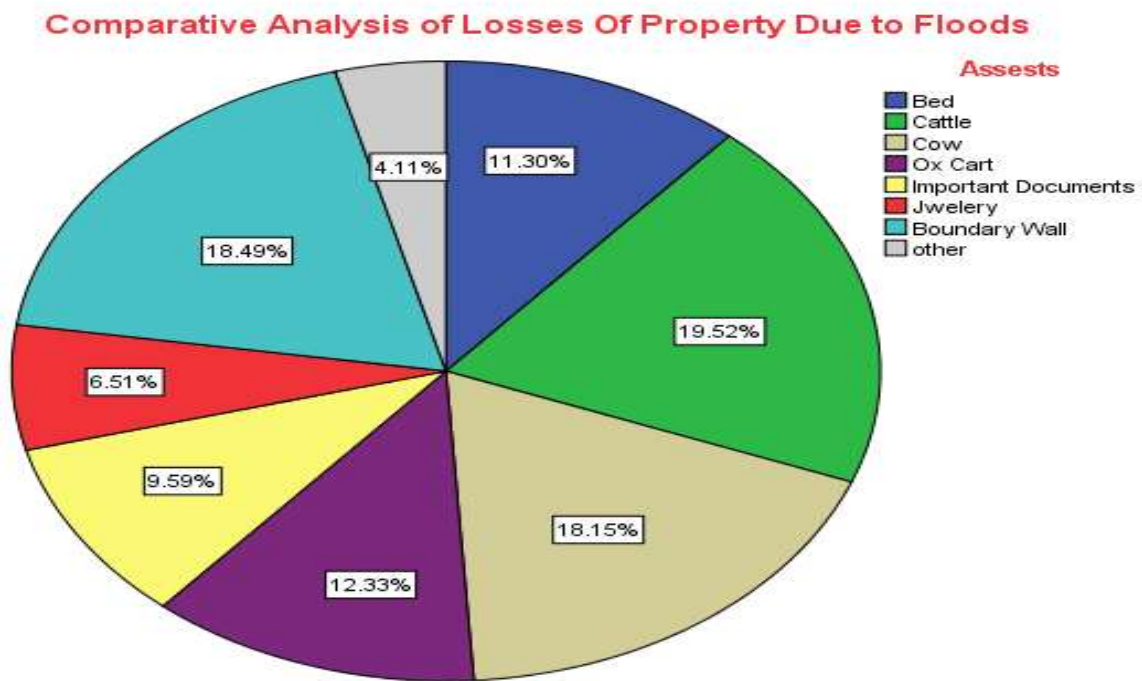


Figure 4.10: Details of Property and Assets Lost by Households

4.2.4 Business

The study revealed that 90% of Union Council community depends on Agriculture related activities and there are few opportunities of the business for the community. Among business they have small shops, business of footwear, fishery form and some of the community has low scale of construction business. Flood mostly effected their agriculture and livestock besides their business also suffered to some extent. Figure 4.11 revealed that 34.78% of households lost their shops, 15% bee production business were affected, 4.35% lost footwear business and 5% of the

household suffered loss of business of construction. 21% shopkeepers, 4.35% related to business of bee production and 8.70% of those how have footwear business were not affected by floods.

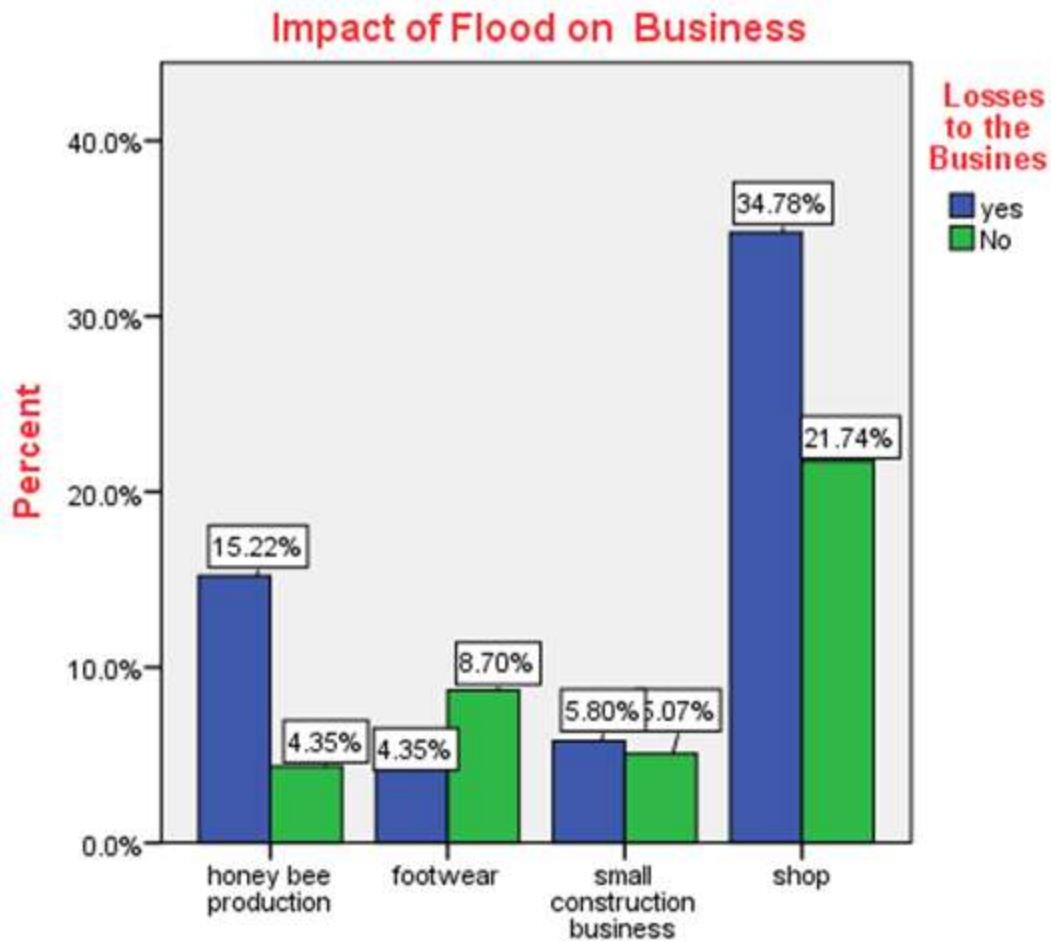


Figure 4.11: Impact of Flood on Business

4.3 Financial Support/Recovery from Flood

Flood damages property and infrastructure requires recovery as soon as possible to relive normal day activities. For this purpose community needs support from Government and other organizations. The study revealed that 90% of household was supported during flood while 10 % of household revealed that they didn't get any kind of support during floods. The detail is shown in figure 4.12

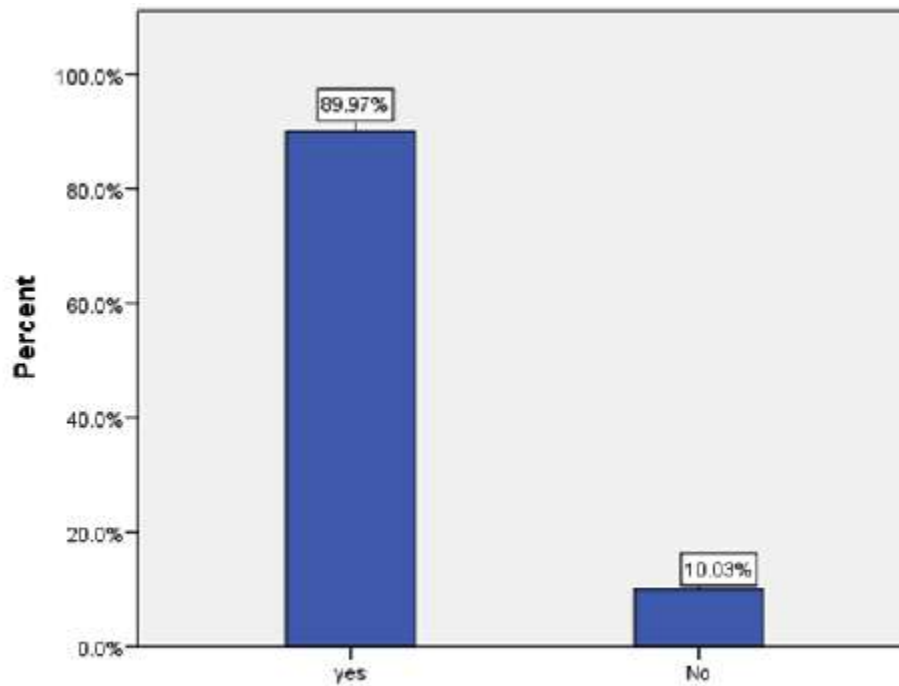


Figure 4.12: Financial Assistance during Flood

The study analysis revealed that maximum households 45.3% (n = 172) reported that they got support from NGO. Furthermore, it is evident that 33% (125) household were supported by government, 9.76% (37) of the households reported that they received support from other source. The other sources of support mean financial assistance from relatives and friends. It is pertinent to mention that 11.87% households were self-supported. The detail is shown in table 4.2 and figure 4.13.

Table 4.2: Percentage Distribution of Households Support during Flood

| | | N | N % |
|--|--------------|-----|-------|
| Households Support during Flood | Govt. | 125 | 33% |
| | NGO | 172 | 45.3% |
| | Self | 45 | 11.8% |
| | Other | 37 | 9.76% |

The same results were also provided by figure 4.13.

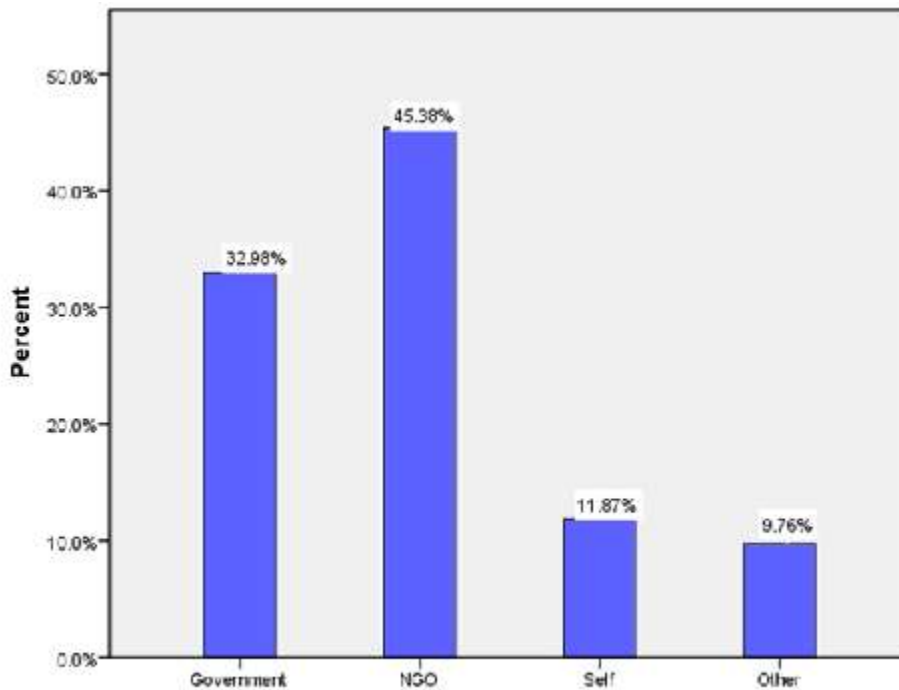


Figure 4.13 Households Support during Flood

4.3.2 Households Response Regarding Sufficient Support

The analysis revealed that among all supported households, 72.56% of the total households reported that the support during flood was not sufficient. About one forth (27.44%) households were satisfied from the support they got during flood from government and other organizations.

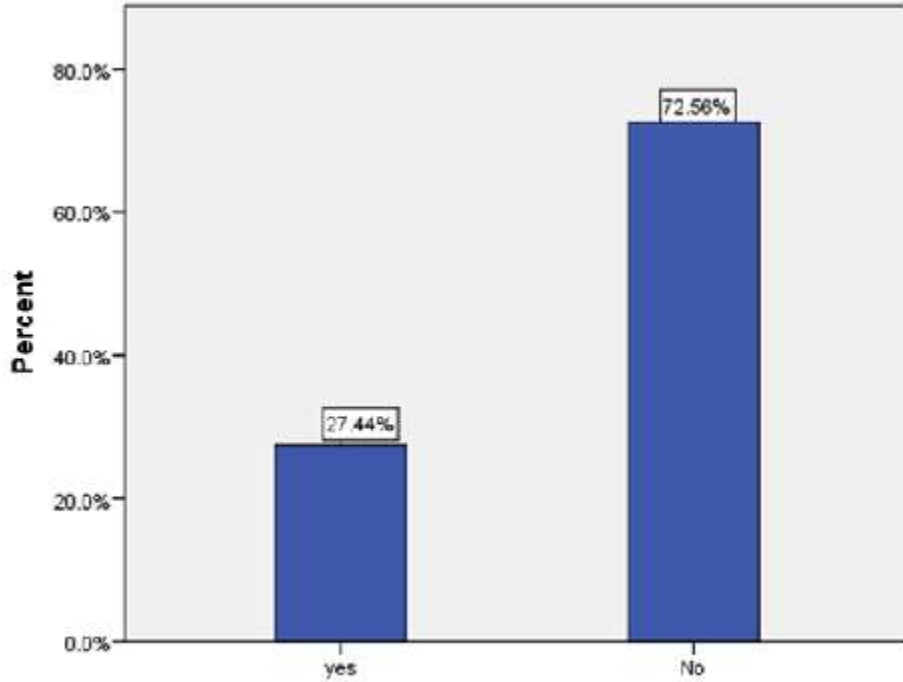


Figure 4.14: Households Response Regarding Sufficient Support

4.3.3 Changes in the Livelihoods after Flood Disaster

The following table 4.3 shows the percentage distribution of change in livelihood of the respondents after flood. The results depict that 27.44% (n=104) of the respondents reported that their livelihoods were improved after flood. The analysis also revealed that 72.56% (275) of the total respondents expressed no change in livelihood after floods.

Table 4.3: Percentage Distribution of Change in Livelihood after Flood

| | | N | N% |
|----------------------|-----|-----|--------|
| Change in Livelihood | Yes | 104 | 27.44% |
| | No | 275 | 72.56% |

The same results also presented in the figure 4.15.

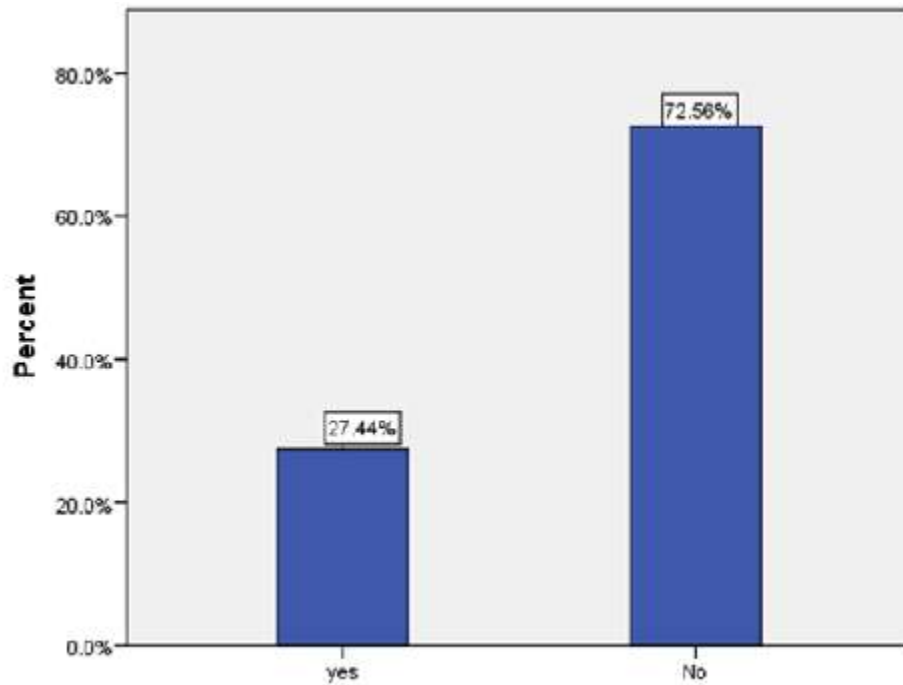


Figure 4.15 Changes in Livelihood after Flood

4.4. Interpretation of the results

From the results of the analysis it is clear that the floods, particularly from the 2010 rainfall season impacted on the livelihoods and critical aspects namely Agriculture, livestock, Housing, Business, Property and Assets of people in Union Council of Agra in District Charsadda. The main livelihood of the sampled households was crop production followed by livestock and wage labor.

The survey established that over 92% of households had their crops damaged mainly sugarcane and maize which is the staple crops. This ultimately resulted into food insecurity at household level. As discussed under the livelihood section, crop production was the main livelihood and income source. This in a way reduced people's income since income sources are embedded in livelihoods. Further, for those households who had some food stocks at the time of the floods, these were damaged and consequently compromised food security at household level.

Housing units, most of which were made of pole and mud were damaged in one way or the other forcing households to temporarily displace to other alternative areas. The results from the study established that households lost a number of both productive and non-productive assets (both directly and indirectly) making them more vulnerable.

The analysis revealed that among all supported households, 72.8% of the total households reported that the support during flood was not sufficient and above 70% of the respondent informed that their livelihood was not improved after the floods.

5.1 Identification of Gaps

Gaps are identified after the attainment of data analysis from the collected data. The data suggests the following grey area which if covered up by the policy makers and main stakeholders can bring positive results and can ensure better disaster risk management in UC Agra, district Charsadda.

5.1.1 Alternative Source of Income:

The farmers at UC Agra mostly cultivate wheat, sugarcane and vegetables. As per research statistics, 70% population of the area dependent on agriculture. The month of July, is the harvesting period for wheat in KP while mostly pre-monsoon spells approach and realize in July which caused floods and devastate the standing crops. The farmers have traditional approaches of agriculture and are totally aware of the alternative approaches of crop cultivation. Flood and rain devastations leave the farmers more vulnerable which leads to a vicious cycle of poverty.

Due to the non-availability of appropriate economic policies and support from the provincial government, the people of Agra do not have variety of alternative sources of income which could support their livelihood sources and strengthen their economic conditions.

5.1.2 Lack of Awareness Regarding Floods:

The local community of Agra has a very low level of awareness regarding flood disasters in terms of mitigation measures. Though, mostly every year rains and floods of low level realize but still the community has been left on the mercy of fate. They think floods as an act of nature which cannot be stopped and prevented. Most of the community people blame their economic conditions that they cannot afford the costly structural mitigation measures to mitigate floods and save their crops and fields.

5.1.3 Lack of early warning system:

In time and effective flood and rain forecast can save lives and livestock of the local community. Though meteorological and irrigation department have the responsibility to forecast the anticipated rains and floods but lack of modern forecast equipment and technology, low human resource capacity on DRR and well-coordinated response among the concerned departments are making the early warning system dysfunctional.

5.1.4 Funds Non-availability for Rehabilitation:

Funds availability for rehabilitation and even for future structural mitigation measures has always been remaining the big issue. The rehabilitation work which initiated post flood 2010 has been left in the middle due to the non-availability of funds and embezzlement done by few organizations. The local administration and irrigation departments are also running short of funds as per their statements. Structural measures like protection walls and embankments need to be strengthened which have been damaged by every year low level of floods and they need funds which are hardly available for flood protection and sustainable livelihoods.

5.1.5 Lack of Adaptation Technique:

The local community instead of waiting for funds and structural measures need to adopt the climate change adaptation techniques which are less costly and easy to adopt. But the gap is that the government and community both have less capacity in this regard. Though some of the local organizations with their international donors and experts have initiated projects on climate change adaptations but they are implemented in very few places. Forest and agriculture departments along with the local administration could facilitated and provide support if mobilized and motivated.

5.1.6 Dense Population in Flood Plain Areas:

Most population of the UC Agra is poor and cannot afford to buy property in save areas. The land available near river banks is less costly. Most poor people have moved in flood plain areas for residential purpose. Flood plain areas are getting denser every year due to the continuous movement of local farmers and daily wagers and have been exposed to flood hazards due to the poor administration of local government.

5.1.7 No Opportunity for Women to Work:

Though women are more than 50% of the total population but still a big proportion of women have been deprived and kept marginalized of the economic opportunities. There are very few economic opportunities for women at UC Agra level. Most of them are housewives with more than 5 to 6 children. Children keep them busy at their homes and limit their scope of bread earning. Those who contribute their share in agriculture are not paid or paid very little in comparison to their male partners.

Keeping more than 50% of population idle, contributes to overburden the male partners responsibilities. Economic needs of the families do not fully satisfy which enhances the economic vulnerability and thus the individual family could not support the flood and rain proofing measures.

5.1.8 No Dam on River Swat and Kabul:

Dam construction is costly but fully prevents the occurring of floods. Unfortunately, there is no big or small dam constructed on river Swat and Kabul in the last few decades which could slow down the flow of water during intense rainy seasons. Though Munda and Amandara headwork's had been constructed on these rivers but rapid global warming and variation in climate phenomena has exacerbated both the frequency and intensity of disasters which demands immediate construction of big or small dams to prevent future flood disasters.

5.1.9 Land Use Planning:

There is no proper land use management at both provincial and district level. Wise management of land can prevent both human and livelihood loses. Most people in Agra have been shifted to flood plain areas for residential and agriculture purpose without knowing that this shifting could bring great human and property loss. The rich fertile soil and cheap land near river banks is the main reason that farmers cultivate their crops on red zone and in reward they gain livelihood loses.

5.1.10 Lack of DRR Intervention in Livelihoods:

Livelihoods of the local community do not have mainstreamed DRR measures. Farmers use traditional approaches of cultivation and are not aware of the alternative sustainable agricultural practices. There is a trend of growing same crops by the farmers and do not accept new ideas due to their conservative attitude.

5.2 Flood Mitigation Strategies for Sustainable Livelihoods

There are number of remedial measures available to make the livelihoods sustainable. These measures include both structural and non-structural mitigation strategies.

5.2.1 Flood Resistant Infrastructure

Structural measures like flood protection walls, embankments and small dams can prevent the disaster lose to the agricultural land, livelihoods and human lives. Though it is bit costly but investment in DRR can save many more in reward. Flood protection wing of irrigation and Construction & Development (C&W) department both are implementing projects related to structural mitigation of cultivated lands and property within their funds limitation but they need big donations, funds from international community and World Bank etc. to ensure complete management of the floods.

5.2.2 Maintenance of Existing Infrastructure

The frequent floods in Agra have weakened the already existing protection walls and protective structures which need maintenance from time to time. The impact of flood can be reduced in this way. Monitoring and supervision of the embankments should be carried out before flood season so that where maintenance is needed should be ensured. This can boost the financial growth of the farmers and livelihoods can flourish.

2.2.3 Funds Provision by the Provincial Government

The provincial government must ensure funds availability to the concerned departments to ensure structural mitigation so that agriculture land and crops gets protection. This will enhance the productivity of the individual farmer as well as economic growth and income per capita will increase. The GDP will improve and country will prosperous.

5.2.4 Economic Policies and Planning

Policies and planning must be framed in favor of the farmers and other income earners. Macro and micro finance plans must be designed in which DRR is mainstreamed and which can retaliate the flood loses. Loans should be provided to the entrepreneurs on easy interest rates so that they increase their economic capacity and reduce their vulnerability against floods. Detail surveys should be carried out in the flood affected areas of UC Agra and on the base of these assessments sustainable livelihood project should be initiated by the government.

5.2.5 Strengthening of Early Warning System Mechanism

Electronic gauges should be installed in the flood catchment areas so that in time forecast of the floods should be made possible. Met and Irrigation department should be equipped with modern technology and radar system. Human resource of the both departments should be trained on DRR and its inclusion in their assignments.

5.2.6 Capacity Building of the local Community on DRR

DRR relevant projects should be commenced in UC Agra so that people get aware their hazards, vulnerabilities and capacities. They should be trained on Sustainable livelihood approaches so that they get aware of the other techniques which are used globally to reduce the impacts of disasters. Alternative approaches with indigenous and scientific knowledge should be applied in the presence of DRR and Agricultural facilitators and experts.

5.2.7 Channelization of River Kabul and Swat

Channelization of the river bodies is a good technique to reduce the intensity of water. River swat is channelized throughout at different spots but on the other hand river Kabul is not channelized. If flood occurs in river swat excessive water can accumulate in channels but if a flood arises in river Kabul then it will be difficult to manage the excessive water properly. That is why channelization of river Kabul will be a good initiate to prevent flood damages. It will also increase the availability of water for agricultural purposes.

5.2.8 Construction of Dams

Construction of dams on River Kabul and Swat should be considered to trap the excessive water. This could be used for irrigation purpose. The initiative of Mohmand dam on river Kabul can play a vital role in it. It can not only mitigate the impact of future floods but also can be helpful for irrigation of land, not only at Charsadda but for Mardan and Newshehra agriculture land as well.

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

Rebuilding livelihoods and economic recovery of the effected population after floods and disaster are major challenges. Such effected community needs special attention from international and national donors as well as from the Government.

The present study was based on the economic impact of floods on livelihoods of UC Agra Charsadda. It is clear from the study that floods had adverse impact on the socio-economic status of livelihoods for people. The study also focuses on the remedial measure for the effective suggestions which may improve sustainable livelihoods of the affected community. A total of 379 households were interviewed and the information was recorded using well-structured questionnaire. The questionnaire were contained questions based on Economic and Demographic information, impact of floods on livelihoods and suggestions which may improve sustainable livelihoods of the affected area.. The Statistical Package for Social Sciences (SPSS) version 20 was used for carrying out the desired analysis.

The analysis revealed that the most important livelihood sources of the Agra community were crop production which is 68.9%, followed by livestock with 14.78%, Wage Labor 10%, Fishing 3.70% and manufacturing 2.11%. Discussions held with community respondents revealed that the main source of income for the most households was crop production followed by livestock production.

The analysis shows that 92.08% of the respondents said that major crop was damaged by the floods in which male respondents were 84.43% while female respondents were 7.65%.The study also found that 37% of the households lost their live stocks and 35% among all the respondents indicated that their business was affected due to floods. The study further revealed that 72% of the households indicated their houses were affected by floods due to which 61% of households were displaced and 39% of the households stayed at their homes i.e. not displaced. Among all displaced households, 45% reported that they got support from NGO's while 33% households got support from government organizations. However, 73% of the total households reported that

the support during displacement was not sufficient while 37% of the total families showed satisfaction with the support they received during floods. As regard to change in livelihood after floods, the results depict that 72% of the total respondents reported that their livelihood was not improved after flood while 28% of respondents reported that the condition of their livelihoods improved after floods.

Clearly, there is need to develop better and appropriate measures (as discussed under the recommendations sections) to remedial measures and mitigate the impact of the floods on livelihoods. Above all, the aim must be to involve the entire key stakeholder to enhance communities' resilience to floods.

6.2 Recommendations

The following recommendations are suggested based on the findings and conclusion of this study.

- In order to improve the livelihoods of the affected population, a mechanism should be made by government which streamlines policies of sufficient funding through government and NGO, S source to support the effected households.
- Government and key stakeholders should engage communities to introduce alternative livelihood strategies.
- There should be a deliberate policy to compel communities to build houses using durable materials and away from the flood prone areas. Building codes and land use planning should be followed.
- The Agriculture department of Charsadda needs to be encouraged. UC Agra Community to increase area cultivated on the upland in order to enhance food security and household level.
- Improve the education facilities and provide awareness about flood zones and guide the people living in flood prone area by providing realistic alternative option.
- The effective early warning system plays an important role in flood risk reduction. Suggestions have been made to make a model specifically for district Charsadda on which bases the intensity of the flood could be evaluated. Flood is almost observed every year in this area. On the basis of rainfall and runoff, the model should be generated which make an ease in flood prediction.

- Channelization of the river bodies is a good technique to reduce the intensity of water. River swat is channelized throughout but on the other hand river, Kabul is not channelized. So if flood occurs in river swat excessive water can accumulate in channels but if a flood occurs in river Kabul then it's quite a difficult job to manage the excessive water, that why channelization of river Kabul will be a good initiate to prevent damage and it will also increase the availability of water for agricultural purposes.
- The current pattern of construction is highly risky in the context of floods. All the construction near river course is muddy .Construction in flood-prone areas should be avoided and it must be shifted toward those areas which are safe from floods or far away from river bodies. Local community needs to follow proper building codes.
- Disaster Management qualified personnel must be hired to look after the disaster relevant activities in agriculture departments.

6.3. Consideration for further research

- There is clearly a need for more research into the human adjustment to the flood hazard, particularly in terms of the perception and behavioral responses to floods. The aspect of early warning and how the information is utilized (what action is taken by the community when the warning is issued) should be investigated.
- There is need for further investigation (environmental impact assessment) on the proposal to construct canals in the flood affected area especially where floods are a natural and recurrent phenomenon.

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Appendices

Annex A

“Economic impact of floods on livelihood of UC Agra in District Charsadda”

Household level Questionnaire

Province Name:

District Name:

Community Name:

Questionnaire ID:

Date of Interview:

1. Household Demographics

| | | |
|---|--|-------------|
| 1.Sex of Household Head | 1 = Male 2 = Female | |
| 2.Sex of Main Respondent | 1 = Male 2 = Female | |
| 3.Age of Head of Household | 1 = Below 15yrs 2 = 16 – 19 yrs 3 = 20 – 39 yrs 4 = 40 – 59 yrs 5 = Above 60 yrs | |
| 4.Marital Status of household Head | 1 = Single 2 = Married 3 = Divorced = 4 Separated 5 = Widowed | |
| 5.Household Size – How many people eat and stay in the Household permanently? | 5a: Male: | 5b: Female: |

2. Livelihood Patterns

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

RANK

- 1. Crop Production
- 2. Trading
- 3. Livestock production
- 4. Shop Keeping
- 5. Fishing
- 6. Wage labour
- 7. Horticultural production
- 8. Manufacturing
- 9. Other, Specify

2.2. Indicate secondary livelihood strategies of the household (more than one answer possible)

| Livelihood Strategy | Yes | No |
|--------------------------|-----|----|
| Crop production | | |
| Trading | | |
| Livestock production | | |
| Wage Labour | | |
| Fishing | | |
| Shop Keeping | | |
| Horticultural production | | |
| Manufacturing | | |

3. Flood Impact

3.1. Housing

3.1.1. Did your house damage/collapse due to floods? 1 = Yes 2 = No

Did the damaging/collapsing of the house force you to relocate to a new
3.1.2. area?

1 = Yes 2 = No

3.2. Property/ Asset

3.2.1. Did the house lose any of the following property or asset?

1 = Yes 2 = No

3.2.1.1. Bed

3.2.1.2. Fishing Net

3.2.1.3. Boundary wall

3.2.1.4. Cattle

3.2.1.5. Cow

3.2.1.7. Ox – Cart

3.2.1.8. Others;

Specify:

3.3. Agriculture

3.3.1. List three main staple crops that you grow:

3.3.1.1. _____

3.3.1.2. _____

3.3.1.3. _____

3.3.2. Did the household experience crop damage during the floods?

1 = Yes 2 = No

3.3.3 Was the main staple crop the one which was damaged?

1 = Yes 2 = No

3.3.4 Did the household experience any loss of food stocks during the floods?

1 = Yes 2 = No

3.4. Business

3.4.1 List three main Businesses that Household do.

1. _____

2. _____

3. _____

3.4.2 Did the household experience any losses to business during the flood?

1 = Yes 2 = No

4 Financial Support/Recovery

4.1 Did you receive any financial support during Flood?

1= Yes 2= No

4.2 Who supported you during Flood

1= Government 2= NGO 3= Self 4= Other

4.3 Did you get any support for the reconstruction of your house?

1= Yes 2= No

4.4 Was the financial support sufficient to fulfill your losses during flood?

1= Yes 2= No

4.5 Did your livelihood option improved after Flood?

1= Yes 2= No

Thank You

Annex B

Community Questionnaire

“Economic impact of floods on livelihood of UC Agra in District Charsadda”

Province Name:

District /Community Name:

Date of Interview:

1. Name of interviewee/s (To be administered only to key district officials and community members).

| NAME | ORGANISATION | POSITION |
|------|--------------|----------|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

2. Livelihoods

2.1. What are the three main sources of livelihood for most households in the UC Agra community?

2.2. What are the three secondary sources of livelihood for most households in the UC Agra community?

2.3. What are the three main sources of income?

2.4. What are the three main sources of food?

3. Impact of Floods

3.1. What was the effect of the flood on the following?

| Areas | Level of Effect | Comments/ Reasons |
|-------|-----------------|-------------------|
| | 1 = No Effect | |
| | 2 = Moderate | |
| | 3 = Severe | |

| | | |
|-------------------|--|--|
| Crop (Production) | | |
| Crop (Stocks) | | |
| Livestock | | |
| Business/Trade | | |
| Property | | |

3.2. Did the communities experience crop and livestock loss due to floods? Explain by giving details of losses and estimate population affected.

3.3. What was the impact of the floods on people's houses? (Explain in Detail)

3.4 What was the impact of Flood on People Business/Trade? (Explain In Detail)

Thank You