Chapter 1

SOCIAL ECONOMIC IMPACTS AND DISASTERS

1.1 HISTORY OF DISASTERS

Term Disaster originated from French word "Desastre" denotes the concept of 'Bad or Evil star' is the blend of two words 'des' meaning bad and 'aster' meaning star. Globally floods are common among natural disasters along different characteristic from region to region. Flood plays a leading role in the occurrence of fatalities and is third in the rank, worldwide. Likely when industrial revolution begun in 1783 that created strange changes on earth which resulted volcanic eruption in earthquake form, Aftermath, disasters were emerged like electrical storm, malaria broke out consequently, generated economic losses. Worldwide, in 20th century flood effectees faced 6.8 million deaths and flood is the real fact that compelled people to prevent their susceptible belongings {Alwang, 2002, Khan, 2008, Robin, 2010; Abbasi, 2011; Tariq, 2012; Kirsch, 2012}.

Fatalities of about 50% from last 25 years clearly point an arrow towards Asia is the most flood-affected constituency. Moreover, Since 1970, world has been faced with 969 riverine flood events more than 89,668 people have died and approximately 336,802,377 US dollars have been lost. Furthermore, in 2008 World metrological department/ global water partnership, includes secondary impacts 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 (Berz, 2000; Borrows and De Bruin 2006;Brouwer, 2007; Looney, 2012).

Future predicts about floods will be converted to become further prevalent serious and frequent. Since ancient times, it is observed that Geographical conditions in flood prone areas are

more favorable for economic growth in terms of food production and it attracts the number of people (Alwang, 2002; Douben 2006; Brouwer, 2007; Carmon and Shamir, 2010).

1.2 PAKISTAN HISTORY OF FLOOD

Like other South Asian countries, in 2008 khan explained "Why Pakistan is more vulnerable" in the world. From 1994-20015, natural and human induced hazards has an ultimate disastrous impact on the lives and livelihood in Pakistan. Floods, earthquakes, landslides, cyclones, and drought are the common natural disasters in Pakistan. fires, civil unrest and terrorism, refugees and internally displaced people, health epidemics, transport accidents, industrial accidents and war are human induced disasters. Report about world disasters (2003), indicated that Pakistan faced six thousand fatalities and 8.9 billion people were affected from 1993-2002 era (Khan, 2008,).

1.2.1 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 8.9 billion and 1.2 million villages affected. Disasters events was 428 per year from 1994 to 1998. This number escalated 60 per cent of 707 events per year From 1999 to 2003. Moreover, 14-20 million people are flood affected, damaged 1.1 million homes, and destroyed 436 health care

centers. Nearly affected 135 districts of countries and gave financial loss of about 9.7$ billion. (Berz, 2000; Oxley, 2011; Tariq, 2012; Pakistan and Power, 2015).

Furthermore, including infrastructure losses were approximately 2.9 million households damaged, severely affected or completely destroyed were 1.9 billion, and lost 80% of food reserves. Other losses impacted on rural economy like agriculture crops, livestock, animal sheds, personal seed stocks, fertilizers, agricultural machinery, fisheries and forestry. (Berz, 2000; Polastro, 2011; World Food Program, 2012; Kirsch, 2012).

1.2.2 Pakistan History Changer 2010 Flood

"100 Years Event" term lost its meaning in 2010 flood. Which was the worst disaster in Pakistan as compared to other disasters like Tsunami, Haiti earthquake in (2010) and Pakistan earthquake in (2005) that's why it is called the deadly year of natural disasters. In 2010 flood, Pakistan faced a greater impact which was the larger than any other recent disaster globally putting an economic and social stress on entire population of Pakistan. Reported rural household monthly salary was less than 5,000 rupees that flood affected badly. In 2010 flood was the titanic in all events, 6,188 people have died, and more than 9.7 US dollars have been lost. This crushes the Pakistan economy through nefarious cycle of international aids. Therefore, Pakistan amended polices for generating high rates of economic growth with governmental accountability will bring out hope to unlock this nefarious cycle. After 1947, Pakistan has spent time and money on floods and relief works.

In spite of adopting Hyogo framework of action (HFA) plan 2005-2015 in January 2005 with that concept to bring about "sustainable reduction in disaster losses" by 2015 but 2010 flood in Pakistan showed that Pakistan is not on a proper track Flood mitigation policies and measures. Therefore, it should be tacky in implementation, work proactively and keep supra priority for

humanity work in order to enable societies to increase their resilience towards flood (Tweedie, 2010; Kronstadt, 2010; Kirsch, 2012;Looney, 2012;Kirsch, 2012;EM-DAT, 2016; Apel, 2016).

1.2.3 Most Risk Prone Provinces

The "Indus river" system have been usually susceptible for frequent floods. Flood in 1992, causing a significant destruction to property and life. After 1992 flood event, remarkably an operational protective system of embankments and flood water controlling organization has been built. Highest annual flooding make Pakistan from one of the five South Asian countries. Because of that average number of people physically exposed to floods. In extreme north of Pakistan mountain ranges is providing a persistent cause of penetration in rivers. Particularly, Punjab and Sindh are always remain under the threat of floods. Whereas, hilly areas of Khyber Pakhtunkhwa, northern federally administered areas and Baluchistan are directly affected from hill torrents.. 1950, 1992 and 1998 flood event losses are unforgettable and cause enormous losses to the national economy. Officially indicated losses of property during 1991 to 2001 floods in Pakistan was approximately in Pak Rs. 78,000 million (Brouwer, 2007; Looney, 2012; Tariq, 2012; Deen, 2015).

Urbanization, unplanned settlements, poor and marginalized population surge and extreme human induced factor in lacking of regulations and preparedness effort are the continuously growing dangerous factor that triggers the threat of flood with direct and indirect impacts. According to, Provincial Disaster Management Authority (PDMA) has proclaimed that the Muzaffar Garh region is the most helpless against floods. The truth of the matter is that their towns are under the danger of confronting floods during and after the monsoon season. Floods are the most damaging natural disaster cause damage from flooding mostly occurs in rural areas, where not only population but also agricultural/livestock assets are affected. In study area villages,

riverine flooding happens between the Indus and Chenab Rivers. As the Indus River enters the town it separates into a few channels. Its two fundamental channels are the River Eastward streams along the limit. This converges with the Chenab River in the East (Tweedie, 2010; khan, Khan, and Ali, 2012;Tariq, 2012;Sandhu, 2013; Deen, 2015; Apel et al., 2016).

Flooding in the rivers brought about the life loss of a huge number of individuals along with significant harm to settlements, infrastructure and the agricultural sector near river banks. If proper early warning systems and proper mitigation arrangement would have been set up then these results could have been minimized or decreased. A riverine flood impact assessment exercise will provide a solid foundation for outlining DRR interventions, mainstreaming DRR, and safer land use planning. The exercise includes information based on impact through gathering and analyzing of riverine flood hazards and development of future scenarios based on frequency, magnitude, and the spatial extent of likely events (Jonkman, 2005; Zehra &Afsar, 2016).

1.2.4 Southern Punjab

District Muzaffar Garh, has a total area of 8249 km^2 lies between the river Chenab and Indus. These river strip is passes along the Eastern and Western boundaries. Respectively, Alipur Tehsil lies between these river strips in a triangle form. Due to its geographical location, it is full of lush green pastures, livestock including Livestock husbandry. Climate changes impacts highlighted here in terms of extreme hot and cold weather. Traditionally wealth has been assessed on the number of livestock basis (Jabbar, 2006).

The traditional tribal culture limit women to themselves to their houses. Therefore, male member are the sources of bread earners for their families. The floods impacted on the people especially vulnerable groups (women, children, Old age, disable). This domain explores that how predictor increases social vulnerability and economic vulnerability of vulnerable groups through

exposure and sensitivity in most neglected southern Punjab areas which is called as rural areas. Furthermore, change in income level and disruption of services (e.g., protected water sources, electricity, education and health related issues) among the affected population was examined in order to better understand how this influenced post-flood living and household conditions in rural settings. According to FFC (2010), major floods are the largest causes of disaster related deaths, because of unwise land management practices are growing human vulnerability (Sathar, 2000; Di Baldassarre, 2013).

1.3 PROBLEMSTATEMENT

The concerned area experienced flooding every year and this flooding occurred due to some factors. A huge populated area situated between the dykes of coinciding rivers. Another factor is the breaching water from weak dykes, and the situation becomes worse during flooding season when rainy water flows rapidly in the rivers. Due to this fact, the affected area faced lots of social and economic losses (damages to lives, infrastructure, agriculture, and livestock) due to high vulnerability. The disaster risk reduction approaches are required to overcome the impacts of floods on vulnerable groups and could be addressed with the improvement of vulnerability risk prone factors.

Community vulnerability could be reduced through multidisciplinary approaches including identifying and educating vulnerable groups with flood risk; therefore, improvement could be made in coping capacities. On that note, there is the need to analyze, highlight, and propose guidelines for riverine flood vulnerabilities of concerned vulnerable groups. The results would ensure a more inclusive way to deal with vulnerable groups and in order to make the study area move towards sustainability.

1.4   RESEARCH GAPS

1. There is observable gap of less availability of data and unawareness about impacts on vulnerable groups facing disasters in Pakistan

2. Health and hygiene issues and there requisite measures are not considered properly

3. Education can cover the gap but its slow track measures

1.5   RESEARCH OBJECTIVES

The Precise objectives of the study are:-

a) To analyze the most vulnerable group due to floods in context of socio-economic impact in Southern Punjab

b) To highlight the risk-prone factors of floods in Southern Punjab

c) To propose guidelines for addressing the vulnerabilities due to socio-economic impact in this region.

1.6   RESEARCH QUESTION HYPOTHESIS

This study therefore endeavors to answer the following questions:

a. What are the impacts of floods on vulnerable groups?

b. What is the influence of community and socioeconomic status during and after floods?

1.7   SCOPE OF THE STUDY

The study covers health, education, awareness, social and economic impacts of flood on vulnerable groups (Women, Children Disable and Old age) along risk prone factors that are contributing in vulnerability of the study area. Furthermore, this study is initiated to cover the most neglected four villages (Kundai, Kotla Ghulam Shah, Kotla Baksh and Sarki) as a sample area to

achieve objectives of the study at the local level. The study also endeavors to establish the underlying causes of vulnerability of people in village community.

1.8 SIGNIFICANCE

This study provide information about social and economic impacts of floods on vulnerable groups and enable government and non-government organizations to take appropriate action during, before, and after a flood situation and helps to reduce vulnerability in the study area. This study also helps students and researchers and provides basic knowledge to conduct further study in the field of disaster management in the future. 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 social and economic impacts of floods on vulnerable groups and the associated risks in Village community.

1.9 ORGANIZATION OF THESIS

1.9.1 Chapter 2: Literature Review

The research problems is better be understand from detailed literature review. Therefore, section 2 is based on some applied assessment from related studies piloted in Pakistan and from different regions of the world. Moreover, theoretical framework gives the review of studies and it contains socioeconomic impacts of floods which explained through global demographic trends predominately in developing countries.

1.9.2 Chapter 3: Methodology

This chapter deals with discussions on research methodology, sampling techniques and data collection process. Primary data were collected. The primary data obtained directly from the study area through established questionnaire.

1.9.3 Chapter 4: Analysis

This chapter consist on statistical analysis, descriptive, correlation, and regression analysis was carried out to achieve the objective of the study. Conceptual frame work and hypothesis was suppose in chapter 3 while hypothesis has been tested by regression analysis in chapter 4.

1.9.4 Chapter 5: Conclusions And Recommendation

This chapter includes findings and discussion of the study conclusions drawn from the study based on the previous researchers. The recommendations are based on the research findings and conclusion of the study.

Chapter 2

LITERATURE REVIEW

2.1 INTRODUCTION

This section helps to understand through literature review about relevant studies, understanding the research problems, different proposed Theoretical framework, and comprehensive analysis of global demographic trends along socioeconomic impacts of floods especially in developing countries. Some of these studies conducted in Pakistan and some conducted in other parts of the world.

2.2 VULNERABILITY

The social vulnerability perspective represents an important extension of previous theories of hazard vulnerability. As a concept, social vulnerability has been defined about people's "capacity to anticipate, cope with, resist and recover from the impacts of a natural hazard". Whereas people's physical vulnerability refers to their susceptibility to biological changes impacts on anatomical structures and physiological functioning), their social vulnerability refers to their susceptibility to behavioral changes (Cannon, Twigg & Rowell, 2003; Cutter, Borough& Shirley, 2003; Burton, et al., 1978; Wisner, Blakie, Canon & Davis, 2004).

Defines: "the conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards". A set of conditions which reduce the ability of a community, household, or an individual to cope with disaster and increase the impact of disaster. Further literature of vulnerability is classified in two classes: vulnerability with climate change, Vulnerability with Global change Research.

1. Vulnerability refers to the capacity to be wounded, i.e., the degree to which a system is likely to experience harm due to exposure to a hazard (Turner et al., 2003).

2. United Nation suggest vulnerability classification UN classified vulnerability into physical, economic, social, and environmental factors (Füssel, 2010).

3. Physical vulnerability such as slum houses, fragile infrastructure, solid waste disposal, exposure to hazards and drainage system (Blaikie, Cannon, & Wisner, 1994).

4. Social vulnerability such as illiterate people, houses with more than three persons sleeping per room, children out of school, elderly population and dependency ratio (Cutter et al., 2003).

5. Economic vulnerability such as migration of people for economic reasons, irregular employment and very low income (Cutter, Mitchell, & Scott, 2000).

2.3 **SOCIOECONOMIC VULNERABILITY**

The basic concepts with historical back grounds of vulnerability. Socioeconomic vulnerability concept emerged in 1976. Vulnerability include restricted capacities are the hurdles for simple needs, Limited resources of education, Clean drinking water problems, Limited access to health facilities, Natural hazard Exposure, Limited opportunities for livelihood with Social marginalization. Matter of fact is that Population is affected by a hazard. But a vulnerability regarding hazard is not in folds in physical components. Specific hazard unfolds vulnerability with number of socioeconomic conditions which overall ensure the increases of hazard intensity that impact vulnerability of community. For example, poor people are unable to build concrete houses and are compelled to live near flood banks. This makes the situation worst whenever threat of flood snatched their shelter and make them helpless. Generally, As poverty increases cause to increase the level of risk gradually because in result poor people are unable to rebuild their

houses(Turner et al., 2003; Yawson et al., 2015). According to PSLM survey (2013-14), 61 percent rural community have access to House Flush.

2.4 **FLOODS**

Floods are the most challenging disaster in all over the world. World-wide, no one can be exempted from the threshold frequency of a flood Bangladesh, India, Japan, China, and America. Another aspect of Climate conditions enhance the causes of flooding. The losses through floods are drastically increasing in current years.

Benson mentioned in 2000 about Flood is a triggering event and worldwide it is in third ranking among all natural disasters. Floods are the utmost occurrence that causes human suffering, problems and widespread damage to buildings, structures, crops and infrastructure. Floods have been observed to disrupt personal, economic, and social activities and set back a nations security and development by destroying roads, buildings, and other assets. Economically, floods are a leading cause of losses from natural events (Bohle, 1994; Brooks, 2005; Khan, 2008).

2.4.1   **Previous Study**

Blistanova, Zelenakova, Blistan, and Ferencz (2016) discuss their paper "Assessment of flood vulnerability in Bodva river basin, Slovakia" Flood affect both physical infrastructure, and living environment. They have used the method of Multi criteria Analysis (MCA) in GIS environment to evaluate the flood vulnerability and explain that flood risk and vulnerability enhance due variation in rain fall pattern, increasing frequency of extreme weather events, unplanned land use system, and construction in flood prone areas.

Boudou, Daniere, and Lang (2016) used historical data through geo referencing in "assessing changes in rural flood vulnerability through mapping land use from historical information" to assess temporal evolution of flood vulnerability by comparing two major floods

events data that is 1910 and 1930 with 2013 in two cities of France. They mention that population growth is key component in increasing flood vulnerability. They also explain that flood vulnerability have been decreased with the passage of time by using mitigation measures. The physical elements of exposure, probability and impacts of hazards, both really natural and unnatural, are the basis for this tradition (Adger, 2006).

Amir Nawaz, Shah Nawaz, and Ali (2012) discuss damages and causes of flood in Village community. They collect data secondary sources as well as primary sources by using questionnaire and interview. They explained that a slum area that is houses has been constructed from mud and stone which is more vulnerable to flood. They also explained that damages occurred in area due to unplanned land used and lack of awareness.

Tsakiris (2014) has been highlighted that the magnitude and intensity of natural hazards is vary in time and space. Under certain conditions and influenced by triggering factors they cause damages. On the base of systemic approach and the rational sequence "hazard– vulnerability–risk he further explains that flood has the most destructive phenomena among the water related hazards.

Alwang, Siegel, and Jorgensen (2002) have liked vulnerability with poverty. They further explain that the individual position i-e. Poverty line is an important component of vulnerability. Poverty and vulnerability closely related with each other. They highlight very useful statement that everyone faces risk but some people are more vulnerable because of inability to manage this risk due to lack of resources and other poverty factors.

2.4.2   Exposure

Exposure denotes to the list of elements in an area in which hazard events can occur. Hence, if population and economic resources were not exposed potentially hazards, no disaster risk would exist.(Birkmann, Fordham et al.). Vulnerability is factors to which community exposed to potential

hazard (). Vulnerability refers to the tendency of exposed elements such as human beings, their livelihoods, agriculture and properties to suffer adverse effects when impacted by hazard events(IPCC,2001;Birkmann, Fordham et al.,).

2.4.3 Sensitivity

The degree to which a system or species is affected, either adversely or beneficially, by climate variability or change" or by geophysical hazards(WorldBank 2016).Sensitivity refer to dependence on environment for livelihoods, shelter, food and medicine; lack of access to take decision, and variety of crossing inequalities including cultural, Socioeconomics, financial and gender status(Bachofen & Cameron).

2.4.4 Potential impact

World bank define potential impact as the possible effects on human or natural assets and systems as a result of exposure and sensitivity, either beneficial or harmful This potential impact is the combination of exposure and sensitivity of physical assets and systems. Hazard has extreme impacts on humans and natural environment depends on the degree of exposure and vulnerability to that hazard Vulnerability is factors to which community exposed to potential hazard (IPCC, 2001;Diop, Hess et al. 2012;WorldBank 2016).

2.5 BACKGROUND OF THEORETICAL FRAMEWORK

Disaster occurrences are frequent throughout the world and large numbers of people are vulnerable to the risk associated with these disaster. Disasters are the outcome of a combination of hazard and vulnerability. When hazard hit a community with low vulnerability will not become a disaster it become a disaster when hazard strike a community with high vulnerability. Neighborhood characteristic (ethnicity, Family structure, Gender, Functional needs, Language proficiency) Risk perception (Awareness, Knowledge of flood protection measures Risk

denial/acceptance, and Trust in officials) Land tenure (owner and return) Socio economic (Income Wealth, Education, Occupation) Health i-e. Access, disease, mortality and lack of coping capacity are indicators which have Connectivity with vulnerability drivers (John-Nwagwu, Edith et al. 2014;Rufat, Tate et al. 2015;Du, Ding et al., 2015).

Vulnerability is a function of the character, magnitude and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity. The concept of vulnerability is the degree to which a system is unable to cope with disaster. Vulnerability is a anthropogenic factors, frequency of climate variation (Hazard), to which a community exposed, including its sensitivity and adaptation. Cutter et al.'s briefly summarized gradually developed changes in hazard and vulnerability towards adaptation trends(IPCC, 2001;Bizikova, Beiali et al., 2009).
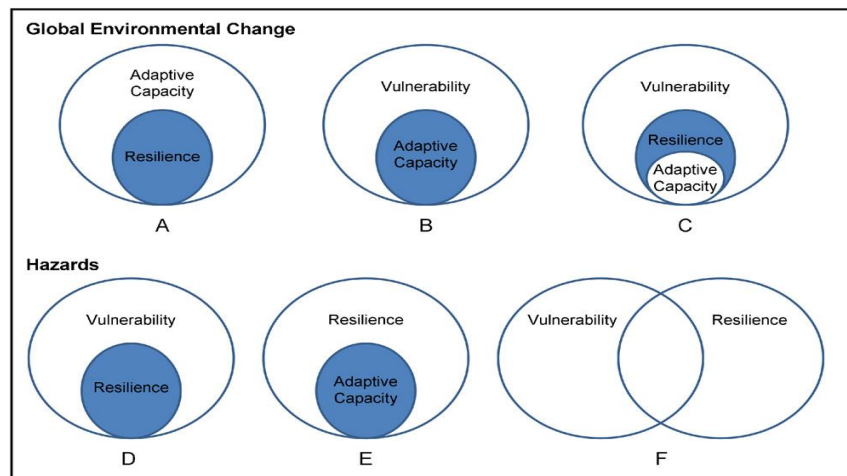
Vulnerability = Risk (Hazard) – Adaptation (Cutter, 2008)

In Pressure and release model (PAR) risk is clearly define as a function of the uneasiness, pressure and the vulnerability of the exposure unit. It directs attention to the situation that makes exposure unsafe, leading to vulnerability and to the causes generating these situations. Used primarily to address social groups facing disasters the claim of the PAR model highlights division in vulnerability by various exposure unit that is Class, ethnicity etc.(Wisner, Blaikie et al., 2003).

Vulnerability for the natural environment have three main component that as Resistance, Resilience, Susceptibility. Resistance: the ability to cope with disaster. Resilience: the ability to return or recover to original position after disaster. Susceptibility: the current physical state following hazards. Vulnerability as the extant of harm under the condition such as exposure, susceptibility and low resilience (Klein and Nicholls 1999;BHUIYAN, 2014).

Vulnerability is the degree to which society or element of society is expected to experience harm due to exposure to a hazard, a uneasiness or pressure Lack of resilience and capacity to anticipate, cope with, and adjust to hazard and change are significant connecting factors of vulnerability(B. L. Turner & Kasperson et al. 2003;Birkmann & Fordham et al.,)

2.6 PRESSURE AND RELEASE MODEL: PROGRESSION OF VULNERABILITY

The Pressure and Release (PAR) model, which was developed by Blaikie, Cannon, Davis and Wisner in the mid 1990's, provides a basic analysis of vulnerability in relation to specific hazards. This model relations dynamic processes at different level and different access to resource profiles, with vulnerability conditions. The PAR model as shown in resembles a nutcracker, with increasing pressure on people arising from either side from their vulnerability, and from the effect of the hazard for those people. The 'release' idea is incorporated to conceptualize the reduction of a disaster and to release the pressure, vulnerability has to be reduced(Wisner, Blaikie et al., 2003;Thinda, 2009).

The United Nations Disaster Management Training Program(undp 1992) defines the elements of the above-mentioned progression of vulnerability as follows:

2.6.1 Underlying causes:

A set of factors deep-rooted within a society. These together form and maintains vulnerability.

2.6.2 Dynamic pressures:

A translating process that effect the channels of negative cause into unsafe conditions. This is due to a lack of basic services or provisions. It may result from a series of macro-forces.
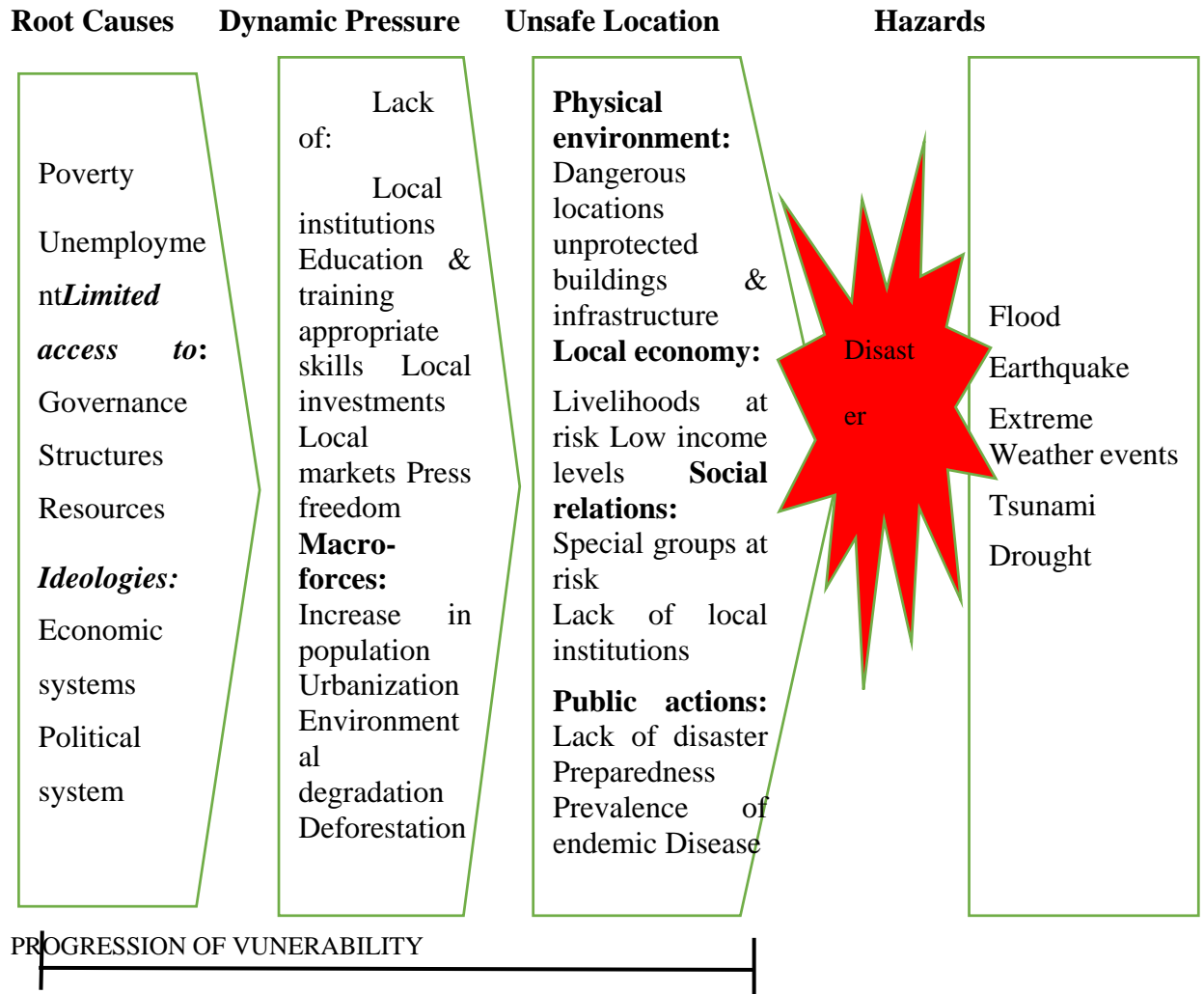
2.6.3 Unsafe conditions:

The context of "vulnerable" explains community and assets are exposed to the risk of disasters. The fragile physical environment is one element; other factors include an unstable economy and low-income levels vulnerability is embedded as a combination of the susceptibility of a given population, system or place to harm from exposure to the hazard and directly affects the ability to prepare for, respond to and recover from hazards and disasters(undp 1992;Balica & Wright et al., 2012).

Everyone faces risk but some people are more vulnerable because of inability to manage this risk due to lack of resources and other poverty factors. Disasters are the consequence of a combination of hazard and vulnerability. When hazard hit a community with low vulnerability will not become a disaster it become a disaster when hazard strike a community with high vulnerability(Alwang & Siegel et al., 2002;Du & Ding et al., 2015).

2.6.4 Causes of Vulnerability:

Flooding is the most destructive phenomena of water related natural hazard, the vulnerability of flood impacts increase day by day due to higher intensity and a higher level of exposure.

Root Causes	Dynamic Pressure	Unsafe Location	Hazards

Poverty

Unemployme nt*Limited*

access to:

Governance

Structures

Resources

Ideologies:

Economic

systems

Political

system

Lack of:

Local institutions Education & training appropriate skills Local investments Local markets Press freedom
Macro-forces:
Increase in population Urbanization Environmental degradation Deforestation

Physical environment: Dangerous locations unprotected buildings & infrastructure
Local economy:

Livelihoods at risk Low income levels **Social relations:** Special groups at risk
Lack of local institutions

Public actions: Lack of disaster Preparedness Prevalence of endemic Disease

Disaster

Flood

Earthquake

Extreme Weather events

Tsunami

Drought

PROGRESSION OF VUNERABILITY

2.7 **POPULATION SURGE**

In the global list of the most crowded countries, Pakistan is ninth with a progress frequency of 2.9 percent per annum. With this growing rate, Pakistan's population will become two folds in the coming 23 years. A rapidly increasing population initiates pressure, and it affects the quality of life where the work force is mostly uneducated and work output is short in the light of community and financial pointers. Pakistan's economy is badly affected by severe and uncontrollable macroeconomic inequalities (Tariq & van de Giessen, 2012).

2.8 ENVIRONMENTAL DEGRADATION

Gillani and Khan (1990) probed that the rising styles of a person's growth and resulting call for nourishment, energy, and housing have significantly changed land-use patterns and harshly degraded Pakistan's woodland environment also. The rising peoples' growth puts a huge burden on land, strengthening at a cost of timberlands and browsing lands. Thus, flat extension of land has rarer possibilities and relies typically on perpendicular development that is reinforced by mechanical development in the sector of farming i.e. manures, insecticides, herbicides, and agricultural fairs. All these apply; causing degradation and reduction of environment with increasing proportions (Reddy & Danssie, 2014).

The growth of rural populations in developing countries, leads to growing population pressures with varying responses. The need for a balance between environmental conservation and the alleviation of poverty in sustainable development as well as marked demographic, economic, and social differentiation and political fragmentation, leads to a changing balance of population distribution. Global warming and ozone depletion have been produced by the great degree of greenhouse gas emissions in developed countries. Severe complications have developed due to the damage of carbon sinks with constant cutting of timberlands in developing countries. The jungles were noted as a result of the high call for wood and other forestry yields in the manufacturing countries. The land vacation of the forest was being twisted into farms to produce crops to be retailed in the manufacturing countries (Karley, 2009).

2.9 RAINFALL PATTERN

Floods are the most exorbitant and inflated of all natural hazards. They are responsible for up to 50,000 deaths and adversely affect some 75 million people on average worldwide every year.

Heavy rainfall is the major cause of flooding. Major floods occur in the monsoon season in Pakistan. According to the Sustainable Development Policy Institute (SDPI) with a multiplying of Carbon dioxide (CO2) emission, normal precipitation in South Asia would increment between 17-59 percent. This can be connected with recurrence of high precipitation occasions and variable monsoons (). Increasing flood lead to disease outbreak especially, in less developed countries. Malaria and Typhoid outbreaks after floods in tropical countries are also common (Rafi, 2001;Brouwer et al., 2007;Brouwer, Akhter, Brander, & Haque, 2007).

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 examples of this. 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).

Exposure to risk becomes unacceptable if it leads to socially unacceptable low levels of welfare. A frequently occurring, relatively harmless risk such as diarrhea may be unacceptable if it mainly affects poor households with limited access to medical care or clean water and therefore results to increased early childhood mortality

2.10 **VULNERABLE GROUPS**

"Socially" The use of the term refers to the society and the context-specific set of norms and values that it deems important. What some societies consider socially unacceptable levels of well-being may be acceptable in others. Social vulnerability is a term that has been widely used in

the natural hazards literature for quite a few years now and it refers to the socioeconomic and demographic factors that affect the resilience of communities (Dewan, 2015; Kuhlicke, 2011;Hoogeveen, 2004).

Studies have shown that in disaster events the socially vulnerable are more likely to be adversely affected, i.e. they are less likely to recover and more likely to die. Vulnerability is often used in a sense somewhat different from its definition here, namely that of 'weakness' or 'defenselessness', and typically used to describe groups that are weak and liable to serious hardship. Effectively addressing social vulnerability decreases both human suffering and the economic loss related to providing social services and public assistance after a disaster (Flanagan, 2011).

These are groups that without substantial support may be in severe and chronic poverty, unable to take advantage of profitable opportunities if they emerge, while with limited defenses in case serious events or shocks occur Examples are disabled people, orphans, HIV infected, elderly, ethnic minorities, certain casts, IDPs, households headed by widows or deserted women, or headed by children (Hoogeveen, 2004).

2.10.1 Female

Decision-making authority in "Northern Punjabi women" have lesser economic independence but better mobility than women in "Southern Punjab". Gender systems are central predictors of women's freedom at the village level. Economic class has a weak and ambivalent influence on women's autonomy in rural Punjab. Education and employment of women both effects by Class system. In rural settings, these remains the routes of empowerment, most women contribute economically. Majority works of household farm and within the household economic unit are under the supervision of women in rural areas (Sathar & Kazi, 2000).

United Nations report (1980) highlight the vulnerability factors for women that (i) Women constitute half the world population (ii) perform nearly $\frac{2}{3}^{rd.}$ of its work hours (iii) Receive $\frac{1}{10}^{th}$ of the world income (iv) own less than $\frac{1}{100}^{th}$ of the world's property(Charlesworth, 2005).

Through disaster a thoughtful disorder becomes formed, where women had to face unlike challenges as compared to men. Number of problems i.e. Women have to face loss of livelihood chances, relief materials shortage, sexually abuse and appreciate little possibility of contribution in first reaction or controlling events. Similarly, they also suffer from converse maintenance law after disaster. Opposing to that, disaster also generates a disorder to ensue miscellaneous positive and productive effects as well as women's life-changing role which often do not get stated(Alam & Rahman, 2014).

2.10.2 Old Age

Wenger and Burholt conducted Bangor Longitudinal Study of Ageing (BLSA) in 2004, conducted in rural Wales from 1979 to 1999, and followed a cohort of survivors from more than 500 people over 20 years. Using both quantitative and qualitative data from the study, the factors associated with increases and decreases in loneliness and social isolation were identified. Furthermore, Vulnerable older people as persons age 65 and older who are at increased risk of functional decline or death over 2 years(Saliba et al., 2001).

Old age flood victims were differentially vulnerable to increases in psychological and physical symptoms on the basis of their age, sex, marital status, occupational status, education level, and pre-flood symptom levels. Flood exposure was related to increases in depressive, anxiety, and somatic symptoms at 18 months post flood. The elderly respond in disasters indicates there are patterns of vulnerability in the social, psychological, and physiological dimensions. Old

age, men, those with lower occupational status, and persons aged 55–64 were at significantly greater risk for increases in psychological symptoms (Phifer, 1990).

In Nepal, old age allowance was introduced in 1994. Citizens above age of 70 are given NRs 500 per month. For the rural region of the country the age limit for the allowance is 60 years. This program provides extra NRs 150 per month for widows ages above 60 (Rajan, 2003).

In Bangladesh, old age assistance program was introduced in 1998. This program cover people of over 65 years of age and currently this program support 1.7 million old age people (Barrientos & Hulme, 2009).

According to Rohbin Touhy research explained developed indigenous knowledge in older adults of the flood from life-course perspective through biography and identity about disaster stories (Tuohy & Stephens, 2011).

2.10.3 Disables

A community faced a problem as a second term of vulnerability in all over the world. It appears as a reluctance of society. It directly associated with the level of poverty and with its issues. These issues include. Reliability of transportation, housing accessibility, assistant for personal care to stick around, access to technology that open worlds for them. Employment strategies are much more difficult for such persons (Dwyer, 1993).

2.10.4 Children

In Bangladesh the incidence of child injuries and parental violence against children was higher among families living in poor socio-economic conditions, whose parents were of low occupational status and had micro-credit loans during the floods (Biswas, Rahman, Mashreky, Rahman, & Dalal, 2010).

These groups are described as 'vulnerable' in the common usage of the term, but (uninsured) risk is not a core characteristic of their problems, even if in some cases, shocks may have contributed to their destitution, and even if the precarious circumstances faced by these groups mean that any uninsured risk is especially difficult for them, since their options to manage risk are likely to be limited. Studies from sociology, examining disaster loss and harm as it relates to age, form the basis for the differential vulnerability (Ngo, 2001).

2.11 **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).

This causes disruption to medical services due to an increase in demand of the medical facilities that results in the reduction of accessibility to those normally requiring medical attention. Malnutrition is also one of the major impacts of flooding, due to disruption in people's means of livelihood which reduces their incomes (Douben, 2006).

Flooding is one of the natural hazards which has the potential to produce has become 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 have killed a million people in this

world. 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, Iftikhar, Shahbaz, Khan, & Luqman, 2013).

The secondary effects due to floods on disruption of systems and services. These 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).

Moreover, Flooding impacts the urban population mainly in terms of human health, economic activity and material infrastructure. The main health impacts include loss of life and infection by waterborne diseases and water pollution, especially when toxic-waste dumps are flooded. Impacts mostly concern result in the interruption of economic activity and damage to physical infrastructure (Benson & Clay, 2000; Berz, 2000).

2.11.1 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 such 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 impact vary with vulnerability of different group. According to Institute of Local Government Studies (ILGS) and International Water Management (2012), Women of study area 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 adverse health (Tariq & van de Giessen, 2012).

2.11.2 Impacts on livestock

The flood also result 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, buffalo suffered the food crisis in the last and recent years' floods. The food crisis of the livestock is one of the major problems during any floods in this study area (Reddy &Danssie, 2014).

During flood time the livestock suffer from different types of health related problems very frequently, and it is very difficult to manage the medical service for sick livestock in such situations. Sometimes, these cattle need to be shifted at animal hospital far from the locality which is very difficult (Karley, 2009).

2.11.3 Impacts of population

Mostly world population in developing countries comprises of youth, while the rest of the population belongs to the aged people. One of the study revealed that developing countries population mostly comprise of people aged over 60 by 2050. These patterns show that world workforce is going to be limited. Inclinations will mean a shrinking working population; ultimately this will change the economic balance between dynamic and sedentary members. In 2050 there will be an increase of 250 million from 175 million of the people who are living abroad. Migration is a major problem in developing countries that will ultimately affect the problem of resource limitation, increase in poverty and vulnerability to natural catastrophe (OECD, 2003; DCDC, 2007; Carmon & Shamir, 2010).

Increasing population in developing countries generates many problems like economic disparity, increased infant mortality, malnutrition and lack of social services, health facilities, poor infrastructure and many other necessities (WHR, 2001).

. Although all these problems are not directly related to population. Disasters and populations are directly proportional to each other. Furthermore, deprived health services and impact of economic uncertainty has significant impact on development (Karley, 2009).

2.11.4 Impacts on health

During the floods, health facilities are most commonly affected. All types of health centers remain closed because of flooding. Published studies (case-control studies, cross-sectional surveys, outbreak investigations, analyses of routine data) have reported post flood increases different water borne diseases like diarrhea, cholera, jaundice and skin related health problems. In flood conditions, there is potential for increased fecal-oral transmission of disease, especially in areas where the population does not have access to clean water and sanitation.

Especially, children and aged people are vulnerable to these types of health related problems. Primary treatment sometimes might not be possible due to lack of accessibility of basic health facilities. Medicine facilities become a difficult service during disaster (Ahern et al., 2005).

In explanatory study variables in a semi-autonomous republic of Uzbekistan revealed about females and old age individuals perceived their health to be far to poor had experience more stressful life events over the past year. Same as environmental problems might influence their and their family health. This research shown environmental impacts in physiological and psychological health problems among exposed individuals to environment (Crighton, Elliott, Meer, Small, & Upshur, 2003).

Another perspective highlight through research is that health advantage of the well-educated is larger in older age groups than in younger. Health advantages of high income and disadvantages of low income also diverge with age, but household income does not explain education's positive effect(Ross & Wu, 1996).

Flood also badly affected women community. Health facilities mostly become inaccessible in season of flood events. Moreover, flood water contamination by different bacteria and poisonous substance, could result in to harmful effects to health. In some areas they were bound to use this water in different daily activities due to the lack of women access to safe water (NDMA, 2013).

2.11.5 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 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).

2.11.6 Impacts on Infrastructure

Physical damage to property is one of the major causes for tangible loss in floods. This includes the cost of damage to goods and possessions, loss of income or services in the floods aftermath and cleanup costs. The flood may damage the canals, road and after other infrastructure. It estimated that most of the infrastructure damaged badly in 2010 flood. Almost every year, heavy rainfall and floods causes a massive damage to all local roads and drainage systems.

Asian development bank (ADB) 2010 estimated the cost of flood damages to irrigation, drainage and flood protection infrastructure at Rs 23.60 billion, which their reconstruction / rehabilitation cost was around Rs 83.00 billion. Federal flood commission (FFC) 2010 report revealed that the flood caused economic losses of US$10 billion, deaths 2000 people, destruction of number 17,533 villages, and affected 160,000 sq.km total area (Tweedie, 2010).

2.11.7 Impacts on the Socioeconomic Condition

The theory and practice of socioeconomic protection in developing countries has advanced at a rapid pace over the last decade or so. There is a growing consensus around the view that social protection constitutes an effective response to poverty and vulnerability in developing countries, and an essential component of economic and social development strategies. Some impacts of floods are intangible and therefore are hard to place economic value. Intangible losses include increased levels of physical, emotional and psychological health problems suffered by flood-affected people. According to previous studies undertaken show that the economic impact of natural disasters shows a marked upward trend over the last several decades. The hazards tend to hit communities in developing countries, especially the least developed countries, increasing their vulnerability and setting back their economic and social growth, sometimes by decades (Barrientos & Hulme, 2009).

Social impacts include changes in people's way of life, their culture, community, political systems, environment, health and wellbeing, their personal and property rights and their fears and aspirations. Social impacts are hard to quantify and can cause significant problems for the long term functioning of specific types of households and businesses in an affected community. A better understanding of the disaster's socioeconomic impacts, therefore, can provide a basis for prediction and the development of contingency plans to prevent adverse consequences from occurring (Rufat, Tate, Burton, & Maroof, 2015).

According to the World Health Organization (2001), psychological health impacts have yet to be fully addressed in terms of disaster preparedness or service delivery. But impacts that have been recorded include acute stress, clinical depression and anxiety, as well as post-traumatic stress disorder (PTSD). A number of reports have shown that these impacts are made worse by the

scale of the flood, the time taken to return to normal, the presence of contaminants, evacuation, and ineffectiveness of other actions and help received (Crighton, Elliott, Meer, Small, & Upshur, 2003).

The Federal Flood Commission that has highlighted poverty levels, people have become more vulnerable because they are forced to live in hazardous areas including flood plains and steep hills. They have fewer resources which make them more susceptible to disasters. They are less likely to receive timely warnings. Disaster mitigation, preparedness and prevention need to address socioeconomic issues contrary to focusing on only geological and meteorological aspects(Tariq & van de Giesen, 2012).

Chapter 3

METHODOLOG

3.1 INTRODUCTION

This chapter deals with discussions on research methodology, sampling techniques and data collection process. 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.

Area of Study

The area of study is a low lying and situated near the Indus River and Chenab River. This hazardous location is known by the name "Doabba" and targeted communities have a great exposure towards flood risk. Langarwah UC is situated under the "Tehsil Municipal Authority" of Alipur and it is the Tehsil of District Muzaffar Garh. Study on vulnerable communities was carried from the selected villages from Union Council Langarwah, the name of these villages are kandai, Sarki, Kotla Ghulam Shah, Kotla Baksh. Farmers irrigated their agricultural lands with tube wells and small pumps.

The main crops of that area are cotton and wheat, sugarcane and vegetables. Agriculture is the main source of livelihood in that area. Another source of livelihood is livestock, small business labor services during cotton and wheat season. Seasonal crop are preferred to grow in the affected area. The literacy rate is very lower because of discontinuation of children after floods and unexpected migration, another notice impact of the river that increases vulnerability of that area is the soil erosion on river banks which has vanished so many villages and productive

agriculture land. Pakistan Bureau of statistics explained Population in 13 UC's with UC langarwah is about 40532 inhabitants and total area covered 20390 where female population is more concentrated as compared to male's population(Annex A).

3.2 TARGET POPULATION

Flood is the most common disaster in most neglected areas of district Muzaffar Garh. District Muzaffar Garh consisted of four Tehsils Kot Addu, Jatoi, Alipur and Muzaffar Garh and number of villages affected during peak flood season. Lots of data collected, designing maps on risk exposures and vulnerabilities have been conducted. But the implementation of betterment is still on their neglected sides. In spite of all this, a little effort has been undergone to estimate the impacts of floods on vulnerable groups socially and economically from a large number of villages, out of 13 Union Council, four villages kandai, Sarki (Kacha & Pakka), Kotla Ghulam Shah, Kotla Baksh are selected as a target population from one Union Council Langarwah that comes under the Tehsil Alipur where the total number of Household is 2,707 from total covered area 20390 (Pakistan Bureau of Statistics) (Annex B).

Moreover, Agricultural areas and farmers in the villages are irrigated their land with tube wells and small electric motor pumps. Main crops of that area are cotton and wheat, sugarcane and vegetables on another side, which is sold to the markets in the city. Majority of houses are constructed of mud and some with bricks and the roads are partly paved showed the socioeconomic condition of these areas (Annex C).

3.3 RESEARCH TYPE

This study has been conducted under a "Quantitative Method". This study uses an experimental design is used in which attitudes are assessed from SPSS treatment. The data are collected on an instrument that measures attitudes, and the information collected is analyzed using

statistical procedures and hypothesis testing. This theory is used to identify hypotheses and the collection of data to support or disprove the hypotheses. Quantitative method were used to achieve the objective of the study. Cochran sample formula is inflexible, predetermined methodology, believes in having a narrow focus, emphasizes greater sample size, purposes to measure the variation in a phenomenon, and tries to make simplifications to the total population (Kumar, 2011). Successfully, gained objective will meet the criteria of quality work through paperwork and adopting methods with quantitative approach.

In this methodology, quantitative data will be based on the primary Data (Questionnaire, field survey, interview) around while continuing through various phases of the research procedure (Creswell, 2013).

3.4 SAMPLING METHODOLOGY AND DATA COLLECTION

3.4.1 Sampling Procedure

Our study focuses on the villages of Tehsil Alipur District Muzaffar Garh. There is considerable geographical diversity in flood effects due to the five rivers flowing through the province. There was considerable variation across the province in terms of rainfall levels, advent of floodwater, losses, and external assistance at the time of the floods. Punjab province is divided into 36 districts, which are further subdivided into 127 Tehsils. Tehsils generally correspond to towns, but within one Tehsil, there may be multiple towns. Each Tehsil is further divided into Union Councils that serve as the local administrative units and can comprise of multiple villages.

3.4.2 Determination of Sample Size

A sample size is a small of the population chosen for a survey. To select an appropriate sample size different methods and formulas are available in the literature(Morse, 1991). Here we use the Cochran's formula for sample size determination (Barlett, Kotrlik, & Higgins, 2001).

This formula allows us to calculate an ideal sample size given a desired level of precision, confidence level and the estimated proportion of the attribute presents in the population.

The Cochran's formula is given as

$$n = \frac{Z^2 P(1-P)}{e^2}$$

Where

P = is the estimated proportion of the Population which has the attribute

e= is the margin of error

And

Z= value is found in standard area table

In our study the estimated proportion of flood effectees is 60% so this gives

P=0.60 we want 95.7% confidence level (margin of errors equals to 0.05) that gives

 Z-values = 1.96

Therefore

$$n = \frac{Z^2 P(1-P)}{e^2}$$

$$= \frac{(1.96)^2 (0.68)(0.40)}{(0.05)^2}$$

$$= 368$$

So a random sample of 368 household is the desired sample size which should be enough to give us the desired results. Out of the total questionnaire distributed among the population through cluster sampling technique we received 337 responses.

3.4.3 Cluster sampling techniques:

For sampling procedure A "Cluster Sampling Process" is implemented for the selection of sample size. This processes less time taking and very convenient(Henderson & Sundaresan, 1982). District Muzaffar Garh is the most risk prone and flood affected areas of Punjab and make southern Punjab belt with four Tehsils (Alipur, Kot Addo, Jatoi and Muzaffar Garh). Only one Tehsil Alipur is selected with 13 Union Councils (Kotla Baksh, Kotla Ghulam Shah, Sarki Old and New, Tibba Burra, Kandai, Malik Araein, Khan Garh Doma, Kotla Baksh, and Khanwah. One Union Council Langarwah is selected through simple random sampling and it is situated between the two Rivers (Chenab and Indus) with total population of 5425 and four villages selected from number of villages. Two out of four, is situated in the flood cluster area and two is situated at some reasonable distance   from   the   flood   cluster   area   as   shown   in   fig   3.1**.**
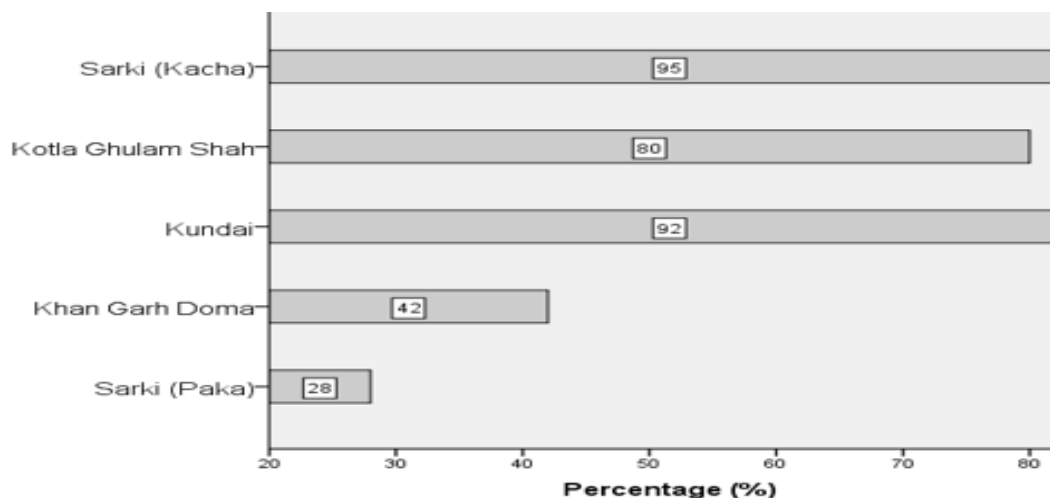
Figure 1: Villages in designated flood cluster between (River Indus and River Chenab)

3.5 RESEARCH DESIGN

The research, conceptual frame work summarizes the concepts of the study. The study consists of mainly three components, the impacts of flooding, socioeconomic impacts and proposed guidelines for improving policy/ strategy. The impacts are the results of the combined

effects of its soil erosion, demographic situation, houses near the embankment area, poverty and unhealthy conditions, cutting of trees and poor agricultural practices. The socioeconomic impacts of the flood hazard resulted huge destruction of lives and infrastructure developments. The coping mechanisms are the communities and the City administration strategies to deal with the effects of floods. And the policy/strategy entails the considerations of administration how to cope with flood hazards.

3.6 **RESEARCH PROCESS**

Quantitative methods has been used for following inclusive research process. Firstly, data have been collected from online data base and detail literature review about disastrous impacts of study area, impact of floods on vulnerable groups, poverty, extent of vulnerability, and strategies of disaster risk reduction at community level. Environmental profiling, problem identification, objectives of study and proposed conceptual framework for study take place in this stage. Proposed data collection tools for quantitative data also base on literature review in this stage. Data collected for this study by using primary data collection techniques. Data collected by questionnaire and field survey have been analyzed and show result in next stage.
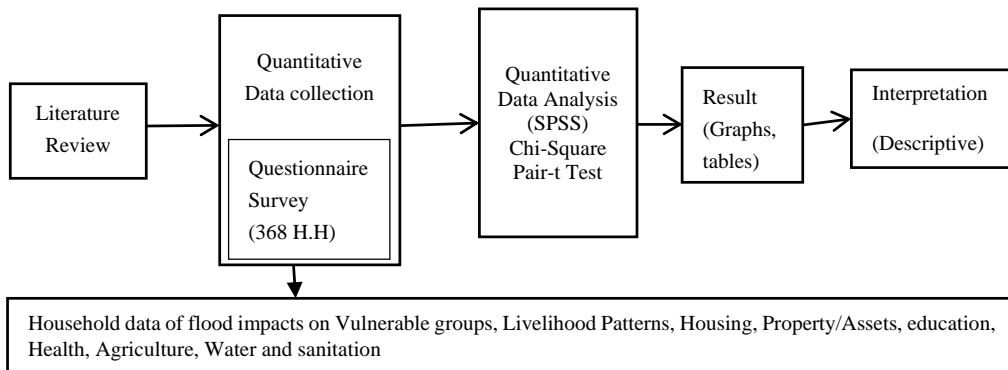
Figure 2: Quantitative Method

3.7 THE PARAMETERS OF INTEREST

The parameters of interest incorporate the population parameters that represent the outline descriptors, the sample insights and the population extent of incidence. The selection of this 4 villages from one union council of Tehsil Alipur on bases of reasons includes; firstly NDMA and PDMA consider this southern Punjab region vulnerable for flood. Secondly due to the fact that exposure to water ways. Cost, time, demographic, and topographic reasons are also contributing in selecting that affected area (Ahmed, 2016).

3.8 DATA COLLECTION

Quantitative methods have been used for following inclusive research process. Data collected for this study by using primary collection techniques(Sale, Lohfeld, & Brazil, 2002).

3.8.1 Primary Data

Primary data have been collected through questionnaire, survey and observation, and interviews. Questionnaire was prepared to collect the primary data. The questionnaire was prepared on the basis of the objectives of the study. Out of 368 only 337 questionnaires were filled by household head respondents remaining were unresponsive and the questionnaire was used to obtain information on the physical, economic as well as social vulnerability.

The objective of the survey was to get information and understanding of the area. The formal questionnaire was designed in a way which is understandable and relevant to settlements, damages to disaster affected people and sensitive local issues related to disaster. Questionnaire based interviews have been conducted in community to collect vulnerability information within the community and to know opinion about vulnerability of area.

3.9 STATISTICAL TOOLS FOR DATA ANALYSIS

Since the current study is a questionnaire based study that comprises of categorical and scale data. For this purpose descriptive statistics have been used for data analysis along with graphical procedures. Similarly for categorical data chi-square test is used for analysis to find association between different categorical data. For this purpose statistical software SPSS (version 20) have been used.

DESCRIPTIVE ANALYSIS OF SOCIOECONOMIC IMPACTS OF FLOODS ON VULNERABLE GROUPS

4.1 INTRODUCTION

Recurrence of flood is common in the study area and its effects are long lasting. It is learnt that the place under inundation and flooding is increasing inside the look at area since ultimate ten years. The flood damage is further divided into two components: Social and Economic impacts. During Observational survey, People of study area shared that there's increasing trends of different secondary results due to flood within the study region.

4.2 SECTION 1: DEMOGRAPHIC DESCRIPTION

This section interpreted on results availability. Findings of these results are based on "Unsafe Condition" "Dynamic Pressures" and "Underlying causes". These factors indicate the key characteristics of "Pressure and Release Model".

4.2.1 Gender of Household Head (H.H)

Total of 337 households were surveyed, out of which 250 (74%) were males while 87 (26%) were females as shown in fig 4.1. The majority age group in this study was between the ages of (35-45) which come to 38% of the total samples surveyed. Other age groups also performing as a household head activities are as shown in figure 4.3 (Terry Cannon, 2008).

It was also found that 8.012 percent of the households other than the heads contribute in socio economic activities of the families while 9% are old age people. Most of the house hold heads were married (see page 11) (70.92%), 14.54 percent single were and rest of them were

widowed, separated 7.72 percent and 6.75 percent, respectively as shown in fig 4.4 (Brooks, Adger, & Kelly, 2005).

The outcome of analysis for respondents having 2 and (<2) unmarried females in a Household reflects the 23.74 percent and 19.88 percent impacts. Likewise, data show that 28.19 percent impact on women in flooding in 95 number of houses having 1 unmarried women fluctuate with average impact on unmarried women in concerned area as show in Fig.4.5 (Blaikie, Cannon, & Wisner, 1994).
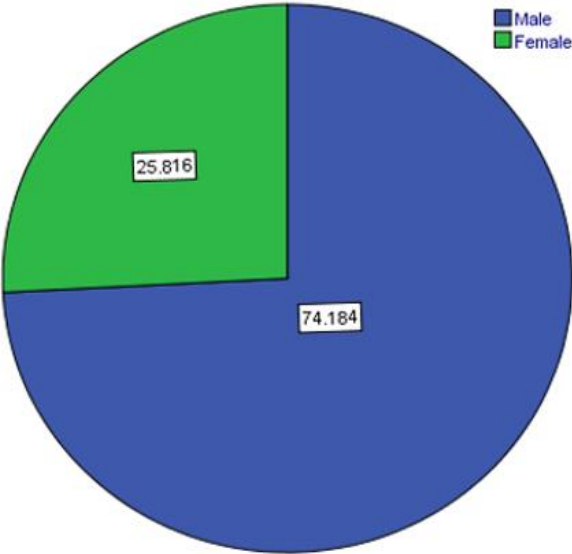

Figure 4.1 : Gender of Household Head (.H)
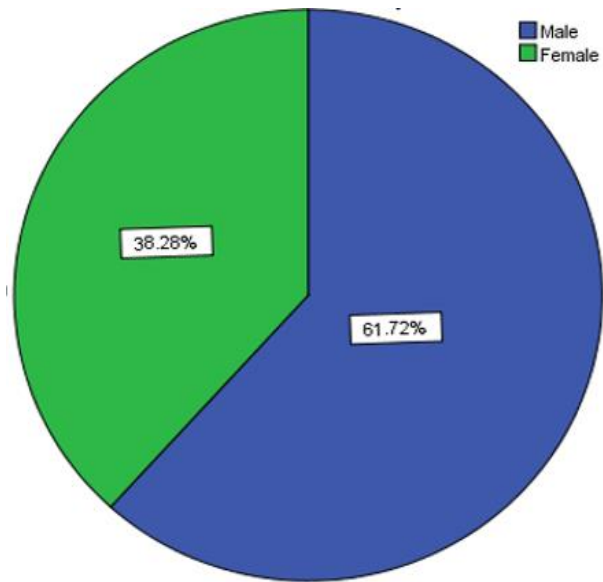
Figure 4.2: Gender of main respondent
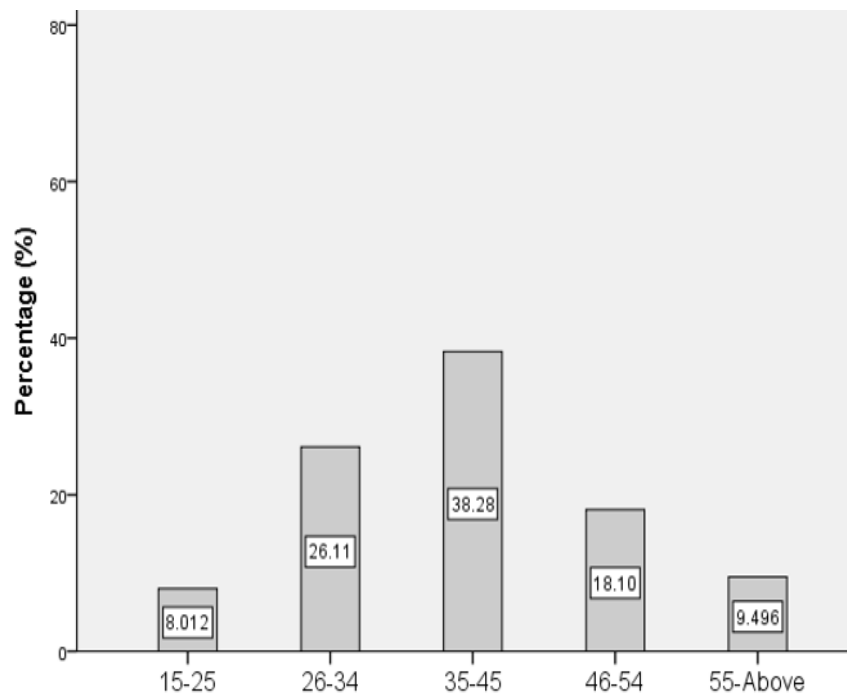
Figure 4.3: Household head age
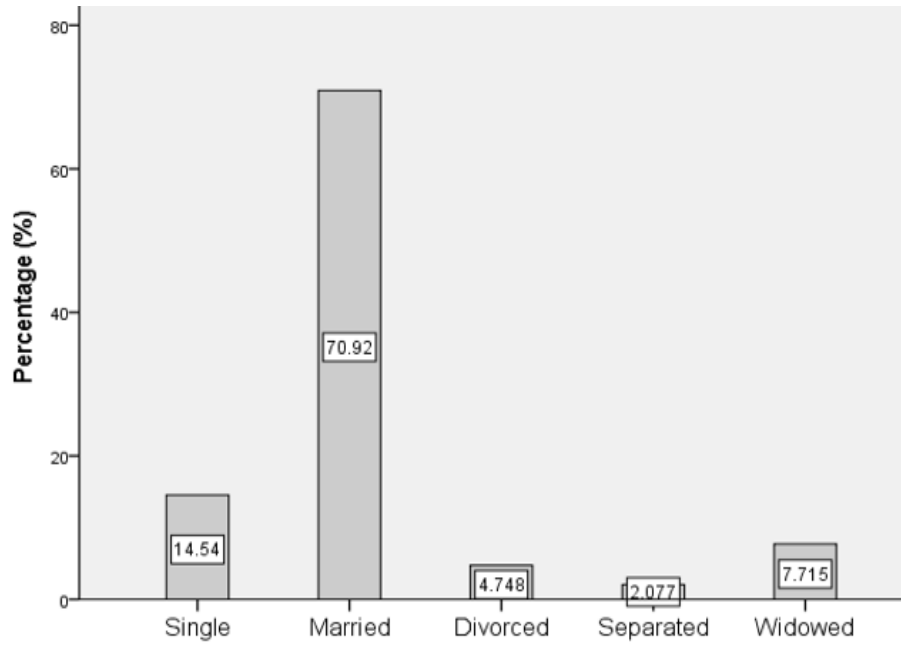
Figure 4.4: Marital status of household head
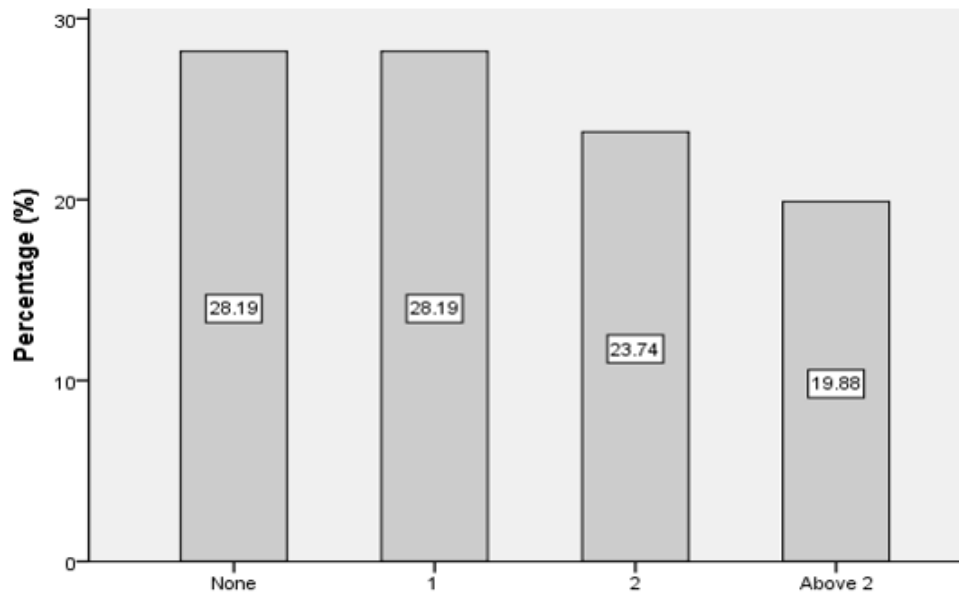
Figure 4.5: Number of unmarried in a household

4.2.2 Education Qualification of the Household Head

Majority of the house hold heads 44.81 percent were illiterate, while matric and under matric comprised of 20.77 percent and 30.86 percent and only from a fraction of percentage 3.56 percent were educated at intermediate level from the overall sample population. Above showing finding the level of education (7) and awareness in the study area is very low and not very supportive for better future as shown in fig 4.6.
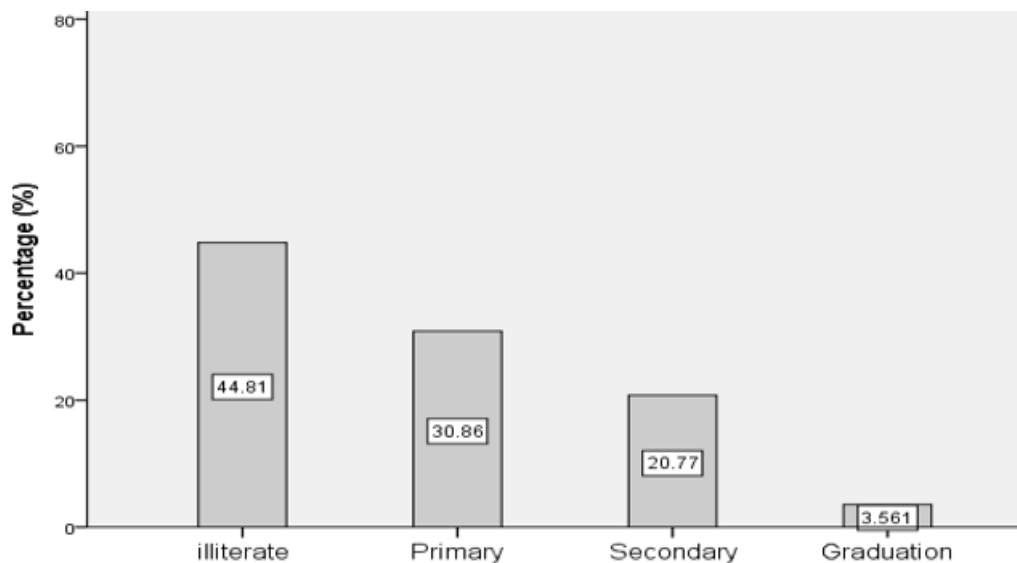
Figure 4.6: Household head education qualification

4.3 PHYSICAL VULNERABILITIES

4.3.1 Houses

Most of the houses in the study area comprised of with Katcha material and semi Pakka material for houses. As results point out that 36.1 percent (Katcha) and 41.84 percent (Semi Pakka) respectively. Only 21.36percent house were constructed with blocks and bricks as shown in fig 4.7. This data finding shows the poverty level and high structural vulnerability of the houses and community towards disasters. Whether, Pakka and semi Pakka houses highlight some adopted

mitigation measures among community who faced frequent flood incidents (Birkmann et al., 2016).
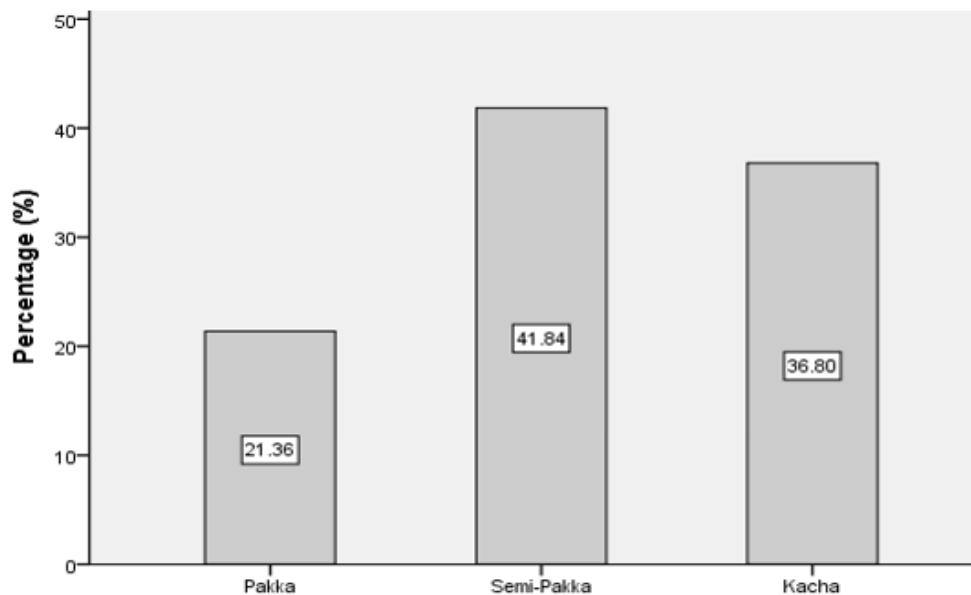

Figure 4.7:Types of home

4.3.2 Main Staple Crop

Due to flood, the economic crop damages is directly estimated from the results. Where households 32.34 percent, economically wheat is a main staple crop for effectees farmers. Likewise, 30.56 percent respondents has comically most important crop is cotton as shown in fig 4.8. The interpretation of result indicate, wheat and cotton are main staple crop in concern area (Nazari, Rad, Sedighi, & Azadi, 2015). Findings highlight, effected farmers have faced direct and indirect economic damages during floods. To somehow flood water is beneficial for sugarcane crop. Flood throws bad impacts on fodder crop and faced limited supply of food for their livestock during flood scenario (Bruckmeier & Olsson, 2014).
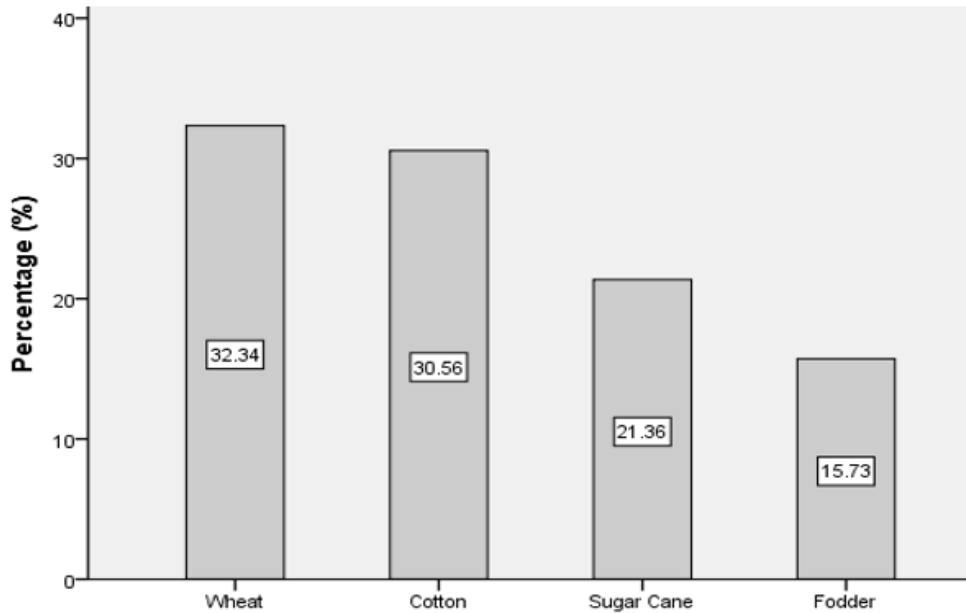
Figure 4.8: Main staple crop grow on large scale

4.3.3 Education Facility

Assessment consequences highlights education vulnerability in concern area i.e. 55.49 percent responses have no availability to education facility and this point out high vulnerable of effected community. Somehow, 44.51 percent responses indicate less functional availability of education facility shown in fig 1.9. Found here that, education is very important for social capital for skill awareness. This education should include with some skilled based courses which leads to combat the challenges of outer world in "Off-farm labour teams". Active participation of Government to facilitate education at village level will increase the capacity to deal with new shocks of flood disaster and exposure of outer world (Van Tuan, 2014).
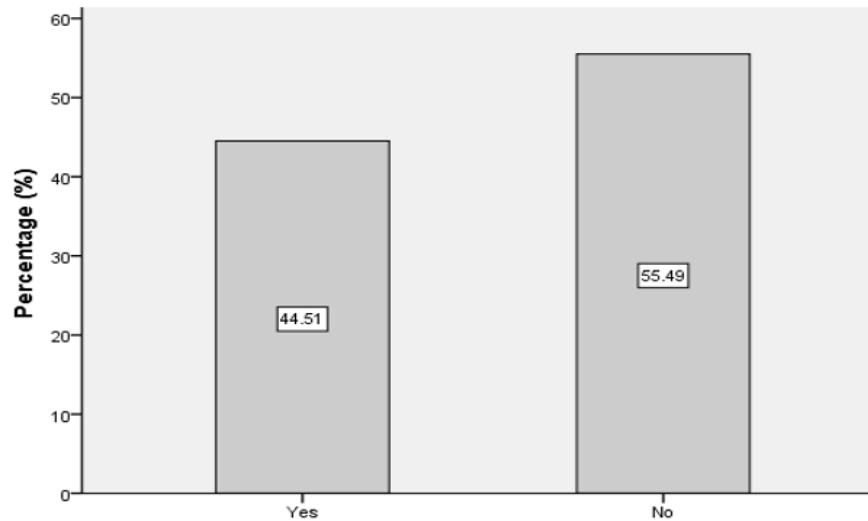
Figure 4.9: Education facility

4.3.4   Health Facility

Subsequently it quantified the medical assistance in concern area during flood situation. Adversely, reported no availability of health facility by 63.60 percent responses in designated flood cluster who experienced flood as shown in fig 1.10. While, only 36.20 percent Results indicate the availability of limited health facility in designated flood cluster with no flood experience. Identified gaps in health issues indicated as health vulnerabilities in extreme case among flood effected communities. This gap can be handled in defined catchment areas through involvement of major universities of medical science and health services were assign to assist with disease control, environmental health, mental health support, and restoration of health facilities for vulnerable groups an community (Akbari, Farshad, & Asadi-Lari, 2004).
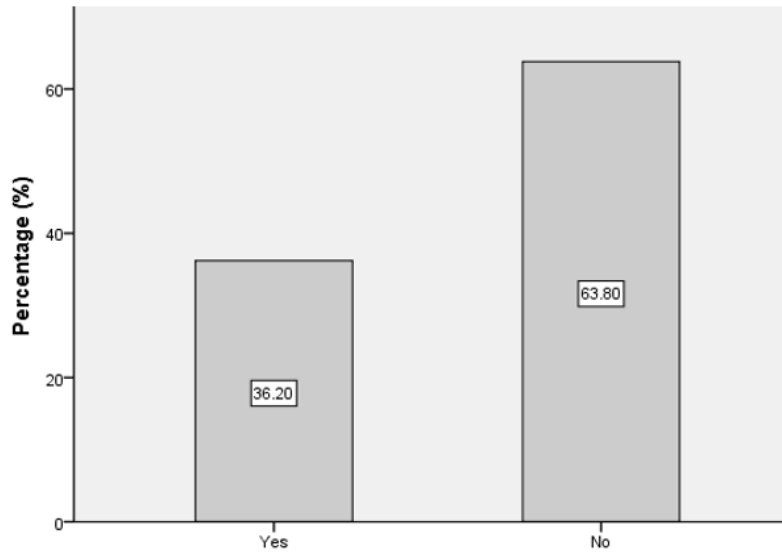
Figure 4.10: Health facility

4.4 VULNERABLE GROUPS

4.4.1 Females

The dominance of Household female vulnerability is highly exposed towards flood hazard in concerned area i.e. Fig 1.11.The results indicate the flood impacts on married women is much higher in overall community. Survey data revealed that 59.35% household females are more vulnerable than 40.65% Household males among vulnerable group as described in Fig 1.11.

This finding leads the planners during pre and post disaster to follow not purely the lucrative code on the other hand including rebuilding and growth benefits for women, which provide extra reimbursements to the flood effectees of low income group (Alam & Rahman, 2014).

4.4.2 Children

Number of children per house hold Fig 1.12.Showedwas also inquired. 98 household having number of children more than 10 which comes to 29.1% of the sample size. Number of households having 6-10 and 1-5 children was almost equal i.e., around 35%. Out of these, majority of families don't bother to send the children to school on engaged them as helping hand in their

work of shop keeping, crop work and taking care of animals. It was found that as high as 38.28% children do not go to school.

Number of children per house hold doesn't have any effect on the school going children data since it was quite varying. The results show dispersed information about school going children. 50 Household had >6 school going children (14.84%). Similarly, 70 households from which (4-6) children were school going (20.77%). Another 88 household reported (1-3) school going children (26.11%). shown in fig 1.13.

4.4.3 Old Age

People having more than above 65 years of age were considered in this category. Around 80% households have one or more than one old age person in their family living with them while 21% households do not have old age persons as in fig 1.14. Amongst them 61.72% were males while 38.28% were females as shown in fig 1.15.

The research from wellington and Christchurch studies identifies the need for coordination multidisciplinary age specific disaster preparedness planning to assist individual and community resilience (Tuohy, Stephens, & Johnston, 2014).

4.4.4 Disabled

The data revealed that around 31% of households have one or more than one disabled person in their family while majority of the families had none. Fig. 1.16.The finding is very much similar to "World population is approximately 15 percent" based on disable persons.

But the positive approach developed by Office of United Nation High Court Commission (OHCHR) to deal with it through a right-based approach and address underlying issues for disables i.e. authorization, implementation and monitoring (Rights, 2014).
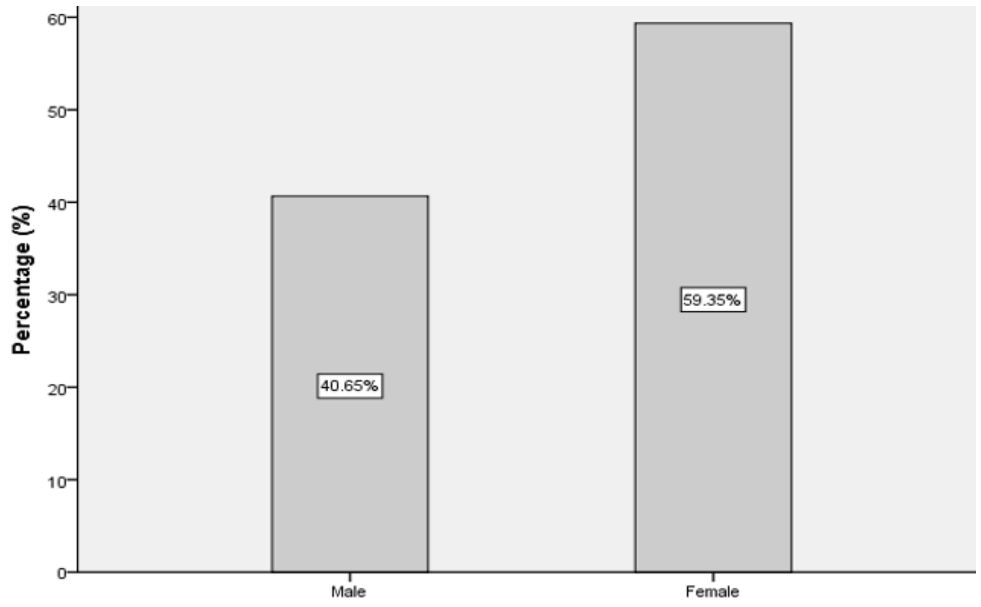
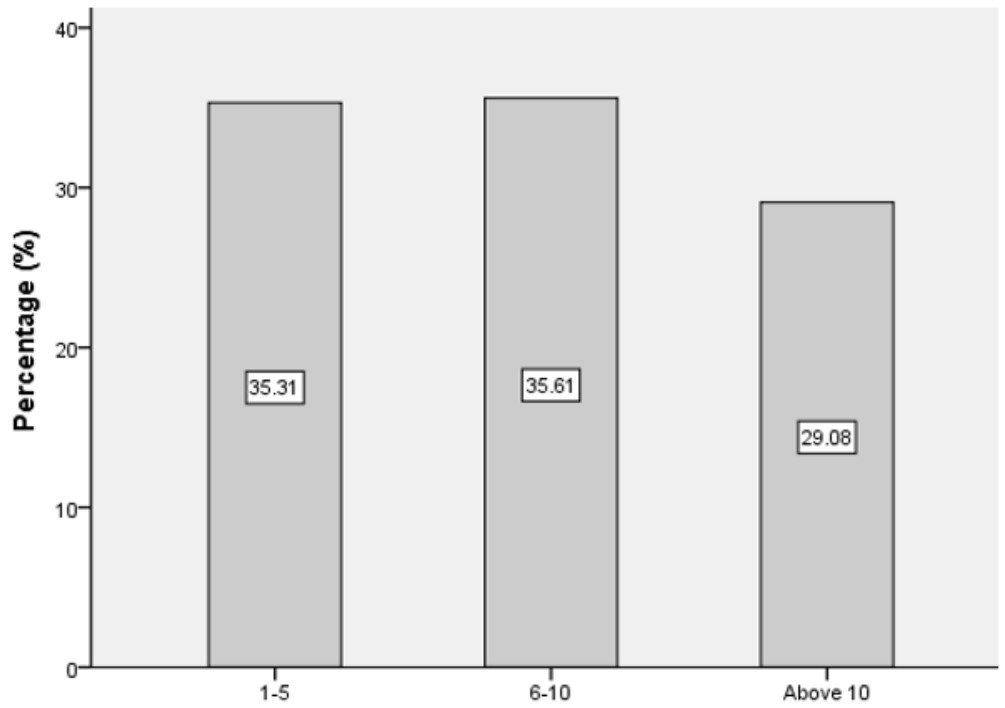Figure 4.11: Most vulnerable household to floods

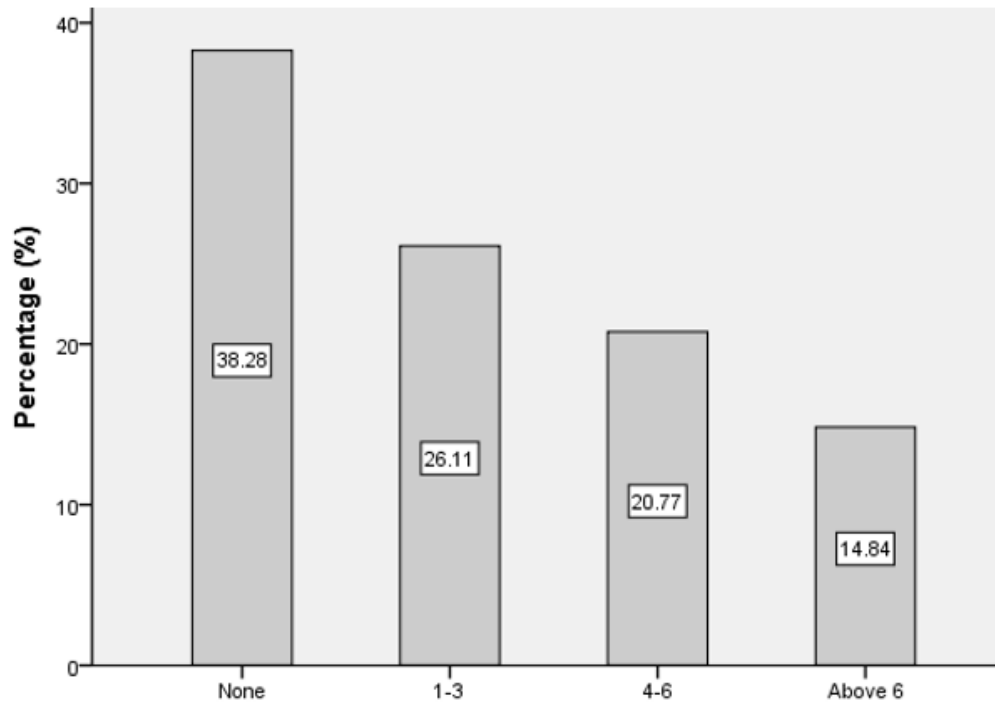
Figure 4.12: Number of children in a household
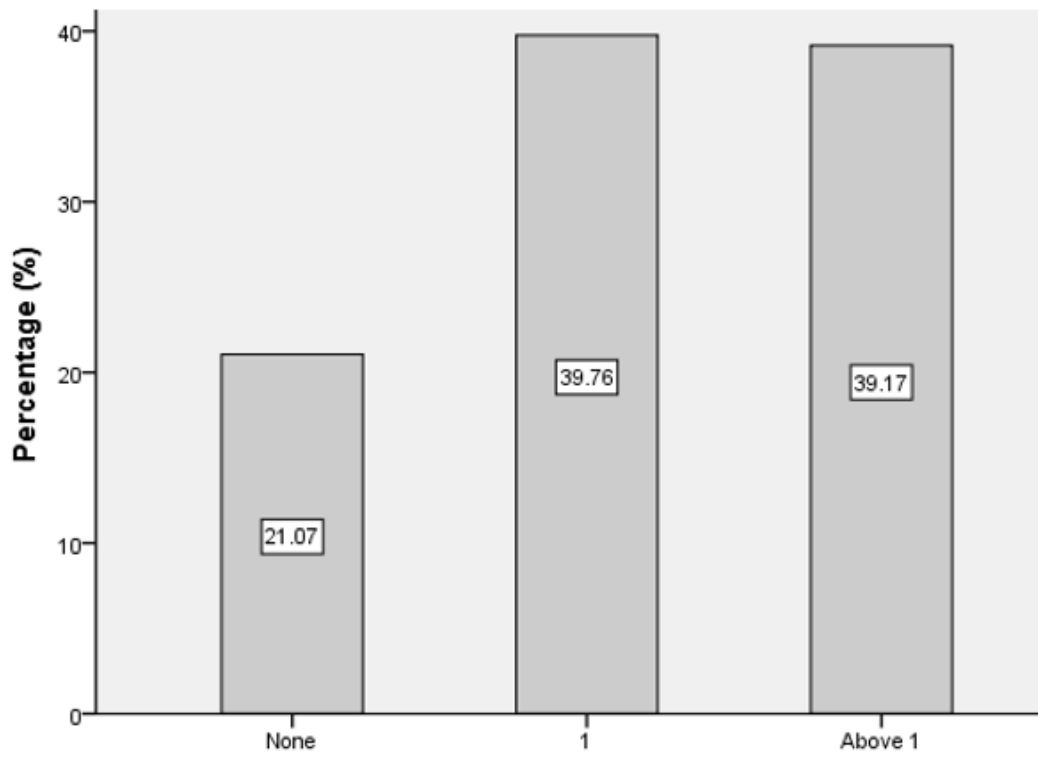
Figure 4.13: Number of school going children
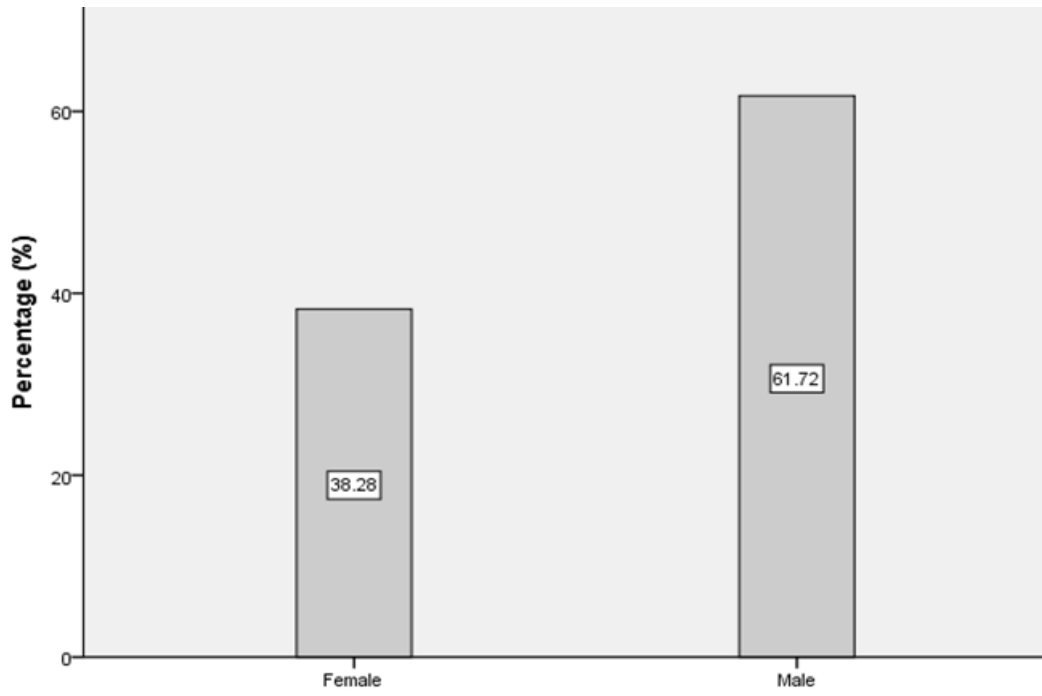

Figure 4.14: Number of old-age people in household
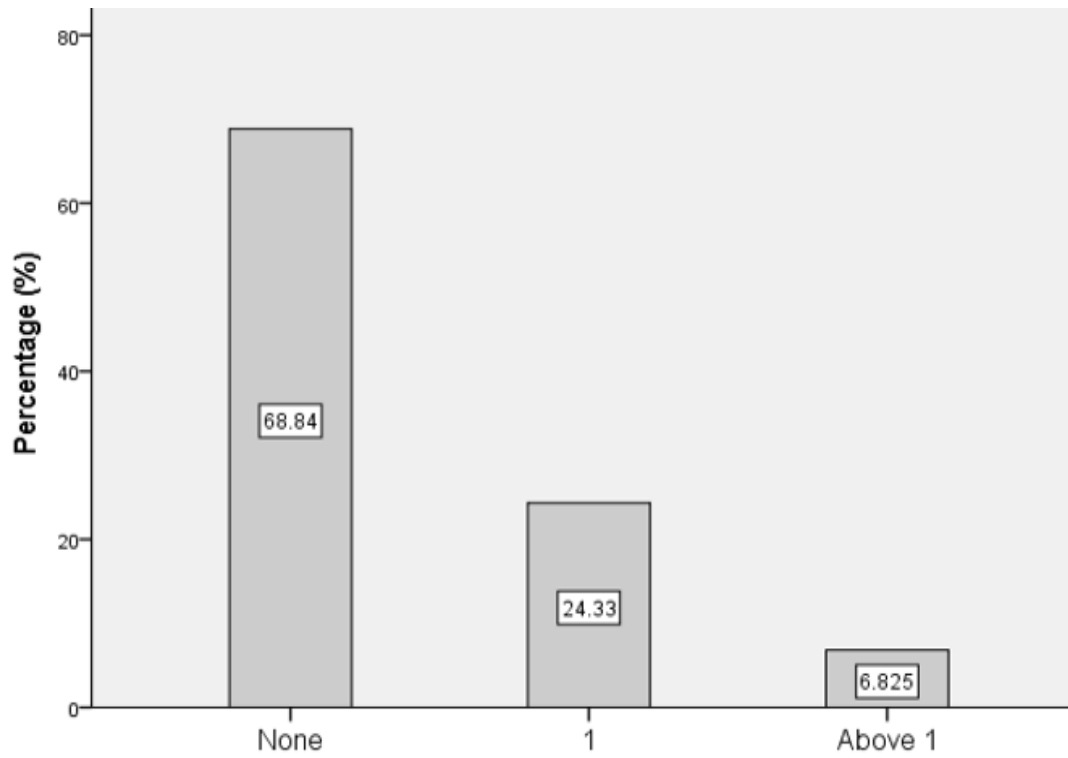
Figure 4.15: Gender of old age

Figure 4.16: Number of disables in a household

4.5 FLOOD IMPACTS ON CAUSES OF VULNERABILITY

Consequences of the assessment highlight the underlying causes of vulnerability in concern area.

4.5.1 Poverty

Poverty is a significant factor in influencing the vulnerability to hazards. Many factors like social, political, economic vulnerabilities emerged through poverty. Poverty is inversely proportional to financial inclusion. As matter of fact, Responses on underlying causes of vulnerability are described as 140 responses indicate the 41.54 percent response for poverty as shown in Fig 1.17. According to World Bank data, Pakistan has the lowest percentage of 8% in poverty headcount at $1.0 and $3.10 per day. From 1998 to 2013, Economy of Pakistan faced inappropriate circumstances at national and international level which leads to lessen the economy from 57.9 to 29.5 (Source: World Development Indicators).

4.5.2 Residing in Flood Prone Area

Same as number of responses highlight 31.75 percent their causes of vulnerability in terms of residing in flood prone area. The finding highlights the people recognition with a significant area difference of about flood experience through a residence time length. This concept hit the awareness aspect of property in an area about effected recognized peoples who are living with the risk of flooding. The finding should be focused on " awareness-raising process" through engaging the local people and their importance of local perspectives about risk (Burningham, Fielding, & Thrush, 2008).

4.5.3   Lack of alternative resources

In flood prone area is indicate to increase the vulnerability at community level. Moreover, 26.71 percent responses for alternative resources lacking shows results as a big gap in coping capacities as shown in Fig 1.17. According to Fredrick in traditional recovery strategies, Recovery begins with people's efforts to rescue what remains of crops, tools and personal belongings.

According to obtained results, 41.54 percent and 31.75 percent are the leading causes of vulnerabilities in concern area. Both vulnerabilities are interlinked then it raise the indirect impact in terms of unavailability of alternative resources as shown in Fig 1.17 from results as indirect impact of flood in flood prone area.
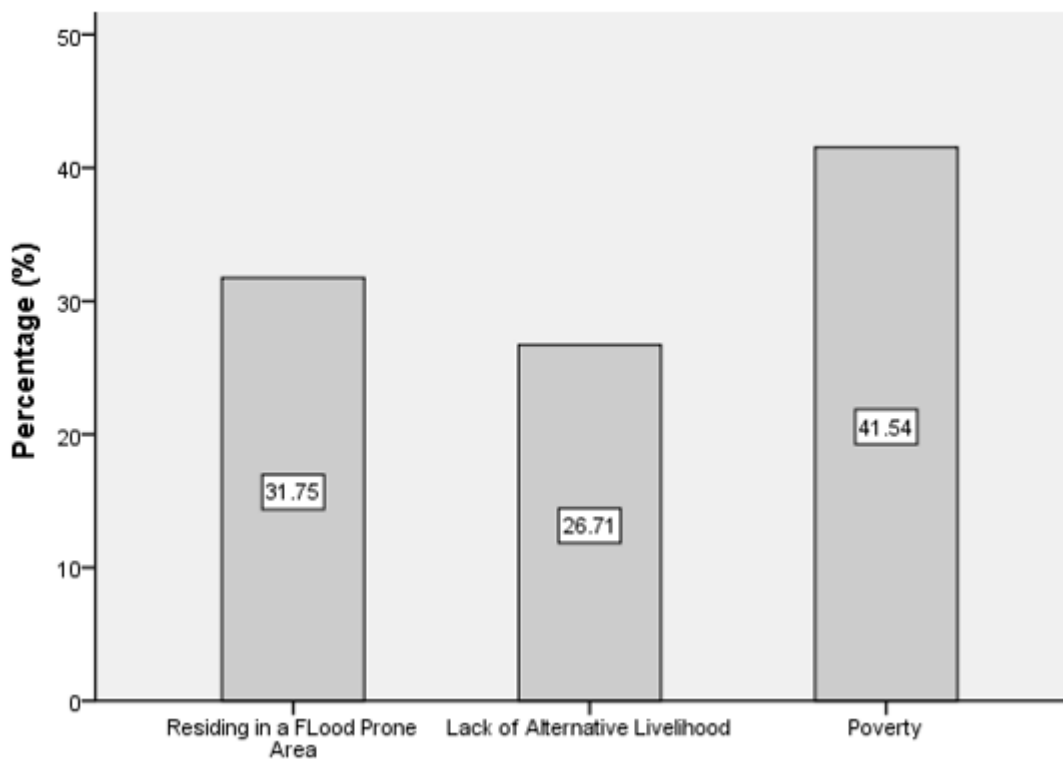

Figure 4.17: Underlying causes of vulnerability

4.6   LIMITED ACCESS TO FOLLOWING SOURCES OF INFORMATION

Access to information refer to the source of information through which or from which the information can be collected such as T.V, Radio, Friend, Civil Society and Disaster management

organization this all sources has been covered in study. The results of the study interpreted below. Many scholars accepts the related finding about information on flood risk which publics are possibly to consider in the context of reasons i.e. their experience of floods , their point of trust in persons who provide them with such emergency warnings (Burningham, Fielding& Thrush, 2008).

4.6.1 Television

It was estimated from the analysis that 30.27% people (102) have very well access to Television information.

4.6.2 Friend

Is most adequate social source of information the result show the real situation of the study area i.e. (100) responses from community share 29.67% information with each other.

4.6.3 Civil society

Refer to social circles like Hurrah system, Jorge Panchaiyt and other places for information dissemination. Moreover, 60 responses with 17.80% access give response in favor of civil society.

4.6.4 Radio

Is easiest source of information and can use anywhere and anytime the results indicate that (53) responses from community have 15.73% access to radio.

4.6.5 Department of Disaster Management

Pakistan was taken initiative to build up institutional capacity in the field of disaster management and proper disaster management system was established such as NDMA, PDMAs and other Disaster Management organizations. Some organizations were pre-established such as FFC, Pakistan meteorological department etc. Access to such organization from local community raise better awareness. However the analysis of the study indicate that no one in the study area

have hundred percent access to such departments while 22 persons with 6.528% have heard about disaster management department but have no access of information as shown in Fig 1.18.

Majority in flood prone area have strong accesses of T.V. (30.27%) and friend (29.67%). Both are playing a leading role in providing information of flood. Similarly, Radio (15.73%) and civil societies (17.60%) are the best source of information.
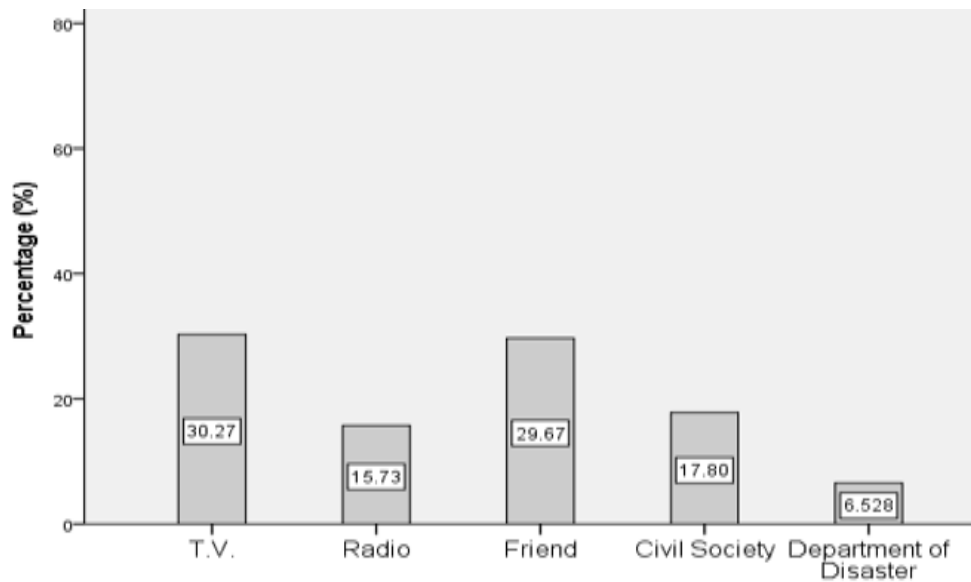

Figure 4.18: Access to following sources of information

4.7 LIMITED ACCESS TO RESOURCES RECOVERING FROM FLOOD

The upshot of the data of this question expresses the financial compensation of the government and relevant organization at response and relief phase through following aspects. Some aspects are perform in a very proactive manner and some are performed with reactive approaches. As interpretation of results indicate about proactive approach of relative support and community involvement.

Here "Religion" factor plays an important role in forms of charitable funding. Contribution from outsiders and mobilization of these funds/resources can help the effectees to stand again after

flood. Important factors like social network and external support to mitigate flood damages in poor Household living flood prone rural areas. Unfortunately, remote from rural transportations not have access to relief and flood-related information and it is very important in flood surviving and adaptation (Van Tuan, 2014; Ngo, 2001; Khan & Khan, 2008).

4.7.1 Relative Support

As per data 45.40% respondents were respond that they receive support from relatives. This reflect the greater support receive by community from relatives.

4.7.2 Non-Governmental Organizations

While 20.77% results show the support from NGOs. This result indicate another useful source for flood effected community support provider is the relevant organization NGOs.

4.7.3 Loan

Social exclusion plays a very vital role to improve the damaged, stuck and barren livelihood conditions. Taking "Loan" is the ultimate source for flood effected communities in study area. Similarly, 16.91% respondents clear that they receive loan for recovery after floods.

4.7.4 Support from Community

Likewise, 10.68% respondents were receiving support from community.

4.7.5 Support from Government

While, 6.231% respondents were respond that they receive Government support as shown in Fig 1.19. The conclusions indicate the low level of support from government sector.
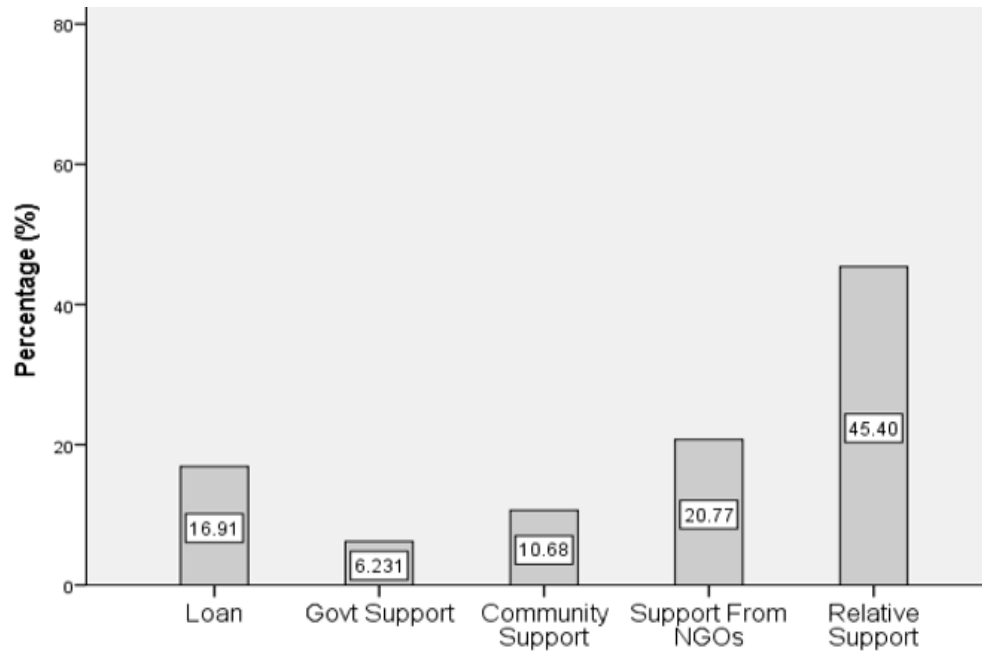
Figure 4.19: Main sources of recovering from floods

4.8 PUBLIC ACTIONS FOR CONTINUATION OF LIVELIHOO AFTER FLOOD IMPACTS

Farming was the major income source as the study area is significantly rural area. According to responses, the facts and figures at household level showed domestic planning for continuation of their livelihood after floods. Timely recovery is a big challenge in most of the disaster. Economic resilience of a community play a key role in recovery phase (Eidsvig, 2012).

4.8.1 Livestock

Steadily according to past disaster events in area 47.77 percent households have livestock to continuation their lively hood expense. Finding elaborate that livestock farming was another complementary income generating source along with crop farming. Livestock play a significant role in sustainable livelihoods of the local communities.

It is a source of energy for the local community of the study area as dung of these animals are converted to dung cakes and burnt for cooking and heating purposes. The heavy damage to

livestock from floods was not only loss of livelihood but also a loss of source of energy of these rural residents (Cuny, 1991).

4.8.2 Stockpile

This is very easily accessible resource for continuation of livelihood in flood effected area. Whereas 43.62 percent people used either directly sell of stockpile to effort for livelihood continuation. The importance of indigenous responses cannot be overemphasized.

In remote rural areas where government assistance may be delayed or virtually impossible to provide, these responses may determine how quickly and effectively a family recovers. Not only is it important to understand these responses, but also to ensure that outside responses do not inhibit or discourage people from applying them (Cuny, 1991).

4.8.3 Selling Jewelry

Majority of the respondents in study area were facing very crucial phase of financial disability because of frequent floods. Few of them as8.605 percent were selling jewelry to balance their low income levels shown in fig 1.20. Finding explored that non farming income sources of effectees by flood water but to lower extent as they were

This analysis make us able to known the level of economic resilience of the study area for timely recovery by taking primary actions for continuation of their livelihood after floods as shown in fig 1.20.doing private business, just like small stores and shops (Sandhu, Lodhi, & Memon, 2011).
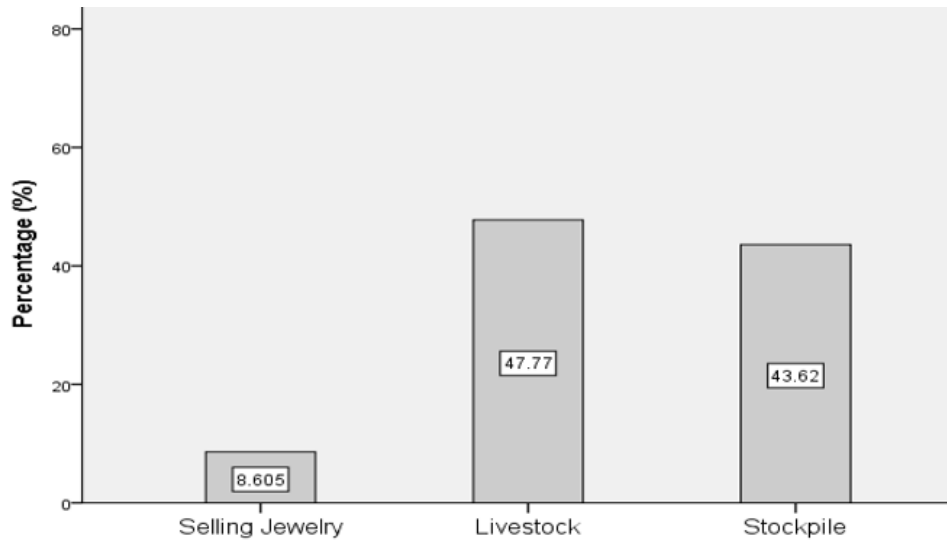
Figure 4.20: Primary actions for continuation of livelihood

4.9 PREVALENCE OF ENDEMIC DISEASES

Flood may lead to infectious disease outbreaks when the result is considerable population displacement and worsen synergic risk factors for diseases transmission. Major diseases could be jump due to flood and their level of impact in concern area. Among number of diseases Depression shows the direct impact with 3.86 percent and indirect impact in 0.59 percent (Kouadio, 2012).

At a glance, 70 percent respondent experienced the flood whereas 29.4 percent respondents not experienced flood but they suffered from many diseases like malaria, itching, diarrhea, depression and measles (Cutter, Boruff, & Shirley, 2003; Eric J. Crighton, Elliott, Meer, Small, & Upshur, 2003).

4.9.1 Malaria

World health organization identified that malaria is a vector-born disease and epidemics in the wake of flooding are a well-known phenomenon in malaria-endemic areas world-wide. During flood or after flood health issues rising rapidly due to inadequate remedial measures and contamination of living environment (Ahern et al., 2005; Akbari, Farshad, & Asadi-Lari, 2004).

About 37.7 % respondent were affected by malaria. Malaria is the leading disease among all disease with direct impact of 28.19% and indirect impact of 9.50% as shown in fig 1.21.

4.9.2 Itching

Few of them were not come under the direct influence of flood but they suffered the adverse effects in terms of health issues i.e. Malaria (9.5%), Itching (10.09%), Measles (0.89%) as shown in fig 1.21.A comparable outline remained understood by investigating the extra precise itching on eye and hands from humid flood sites (Wieslander, 2007).

4.9.3 Diarrhea

Health problems generated by affected water facilities during flood (Akbari, 2004).   The common perception about flood effected community in study area are interconnected. The community facing indirect impact in terms of Diarrhea (8.31%) as shown in fig 1.21.Diarrheal disease outbreaks can occur after drinking water has been contaminated and have been reported after flooding and related displacement (Organization, 2005).

4.9.4 Depression

As per facts and figures 0.59 percent respondents faced indirect impact of flood psychological problems in terms of depression Contribute as well like other health problems. Sudden and wide spread losses due to disasters exacerbate the depression and effect human health desperately (Crighton, 2003).

4.9.5 Measles:

Flood effectees 5.04 percent respondent faced measles outbreak during flood experience. On other aspect, 0.86 percent respondents faced flood impact in terms of measles as shown in fig1.21 In 2005Pakistan earthquake, many people lost their lives because of worst measles outbreak (Akbari, Farshad, & Asadi-Lari, 2004).

According to Measles-Rubella Bulletin, the data analysis on the region reports 6,494 cases in 2017, while in 2016 the reported cases were 2,845 (The Express Tribune, 2018). In Pakistan 2017, 65 percent number of Measles cases were reported (Pakistan Today, 2018).

Overall finding indicate, risk assessment is vital in post-disaster situations and the fast execution of control measures through re-establishment and development of primary healthcare delivery should be given high priority, especially in the absence of pre-disaster surveillance data.
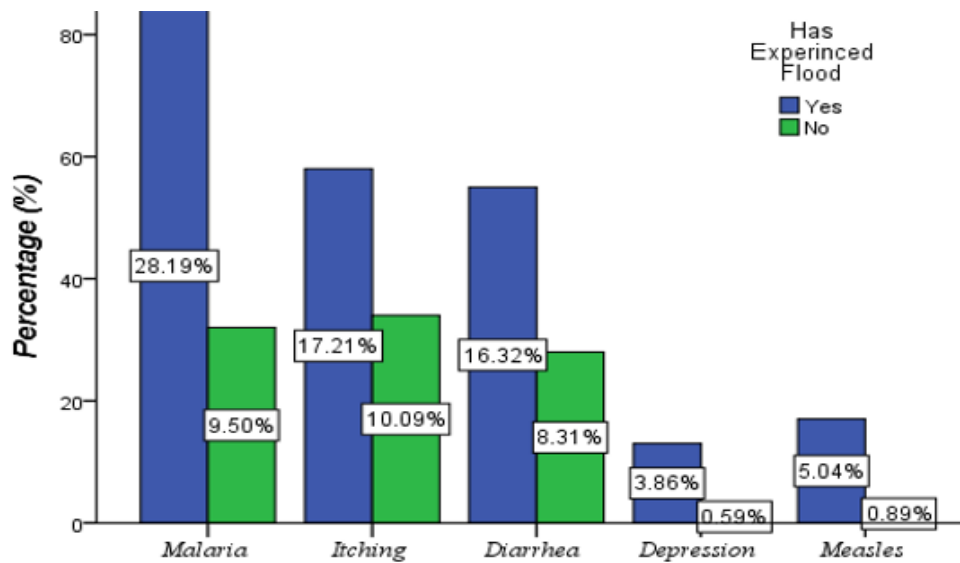
Figure 4.21: Disease were experienced by the member after flood

4.10 DANGEROUS LOCATIONS DRINKING WATERSOURCES

As result highlight the availability of drinking water through following common resources. All were inundated with flood water so major outcome of result in terms of 39.47 percent responses indicated pond of flood water is used by rural community in flood prone area (Blaikie, Cannon, & Wisner, 1994; Tapsell, Penning-Rowsell, Tunstall, & Wilson, 2002; Organization, 2005),

Furthermore, 6.231 percent responses uses river water for drinking as shown in fig 1.22. Finding in concern area indicate about accessibility of safe drinking water during floods were become difficult. This difficulty shows by the presence of 23.44 percent tube wells and 24.93

percent for bore hole are comparatively almost equal for drinking water (Alwang, Siegel, & Jørgensen, 2002; Shehzadi et al., 2015).
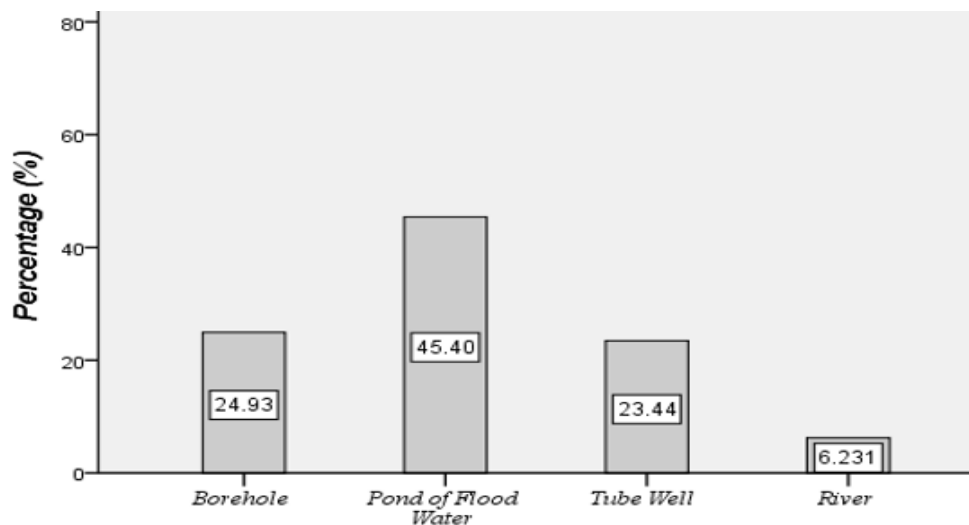
Figure 4.22: Common source of drinking water

4.11 SANITATION

Indicator of the flood impact is to study a sanitation level in a flood effected community. This question describes the availability of different type of sanitary facilities in concern area. Results from fig1.23indicate that 43.32 percent responses uses "Open Air" are a big source of generating health problems and cause to increase health vulnerabilities (Tapsell, Penning-Rowsell, Tunstall, & Wilson, 2002; Organization, 2005).

A very small number 14.24 percent have washrooms in their household. Rest of all, likewise,21.96 percent uses traditional pit latrines, 20.47 percent have reticulated sewerages. Findings discovered deprived sanitation level specifies poor socio-economic conditions. Sanitation level in a community can better be judged through the type of toilet in a household (Burningham, Fielding, & Thrush, 2008)

Figure 4.23: Available sanitary facilities

4.12 **SECTION 2: PROGRESSION OF VULNERABILITY**

Table 4.1: Flood impact with experienced and inexperienced flood

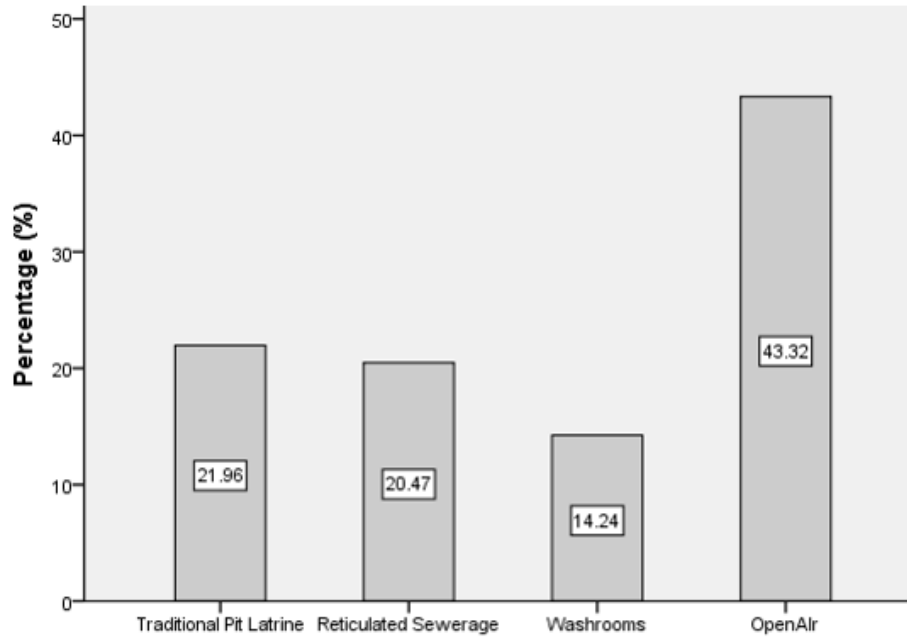| Variables	Categories	Experience Floods		Chi-square	P-values (2-Sided)
		Yes (%)	No (%)		
Faced flood Disaster Every year	Yes	143 (78%)	39 (21%)	12.049	.0005
	No	95 (61%)	60 (38%)		
Lives in a designated flood cluster	Yes	219 (73%)	78 (27%)	11.69	0.001
	No	19 (47%)	31 (51%)		
Flood Taken Measures	Yes	146 (75%)	48 (24%)	4.733	0.03
	No	92 (64%)	51 (35%)		
Do Authorities give Warning Signals in Case of Floods	Yes	125 (91%)	12 (9%)	47.29	0.000
	No	87 (43%)	113 (56%)		
Wasting of productive time (Agriculture, trading, transport ,labour, education, health)	Yes	219(74%)	78(26%)	11.697	.0001
	No	19(48%)	21(53%)		
P-value>X^2 have a significant relationship in strong, extremely high terms.: p<.01,p<.001,p<0.05					

4.12.1 Frequent Floods

As per facts and figures the result of x^2=12.049 and p-value=.0005(<0.05) shows an extremely high significant relationship between floods and the community living in flood prone area who experienced flood and its direct impact as shown in table 1. Findings revealed that outcome of frequent flooding, cause to gradually increase\the vulnerability in terms of root causes,

dynamic pressures and unsafe conditions i.e. poverty. Health, education, in terms of preparedness, physical environment, special groups at risk (Burningham, Fielding, & Thrush, 2008).

4.12.2 Lives in a designated flood cluster

The interpretation of data x^2=11.96 and P-value = 0.001(<0.05) indicate an extremely high significant association, means there is a significant association in those communities who lives in a designated flood prone area. Similarly, responses on living in flood prone area has experienced flood. On other hand, those who lives in flood cluster faced indirect impacts of floods In spite of flood experience. Findings indicate that living in a flood prone area is not a problem but facing the circumstances without taking flood measure and no preparedness is a problem. Absence of flood measures at government level and no or less preparedness at H.H level cause to increase the vulnerability (Terry Cannon, 2008).

4.12.3 Taken Measure against Flood

The results indicate the importance from x^2=4.733 and the p-value=0.03(<0.05) has high significant association with taken measures against floods. At high level of flood risk i.e. frequently occurrence of disaster with high intensity and high magnitude. The community need to well prepare for taking flood measures at house hold level. Findings revealed preparedness at H.H level plays an important role. This helps in lessen the physical vulnerability on large scale (Birkmann et al., 2016).

4.12.4 Warning Signals from Authorities

Do authorities give warning signals in case of floods, to find out the strong communication for generating warning signal for those communities that are under the threat of any disaster especially here for floods. An extremely significant association observed from x^2= 47.89 and the p-value = 0.000 (<0.05) of warning signals provided from authorities to affected community as

shown in Table 1. Findings revealed that warning signals from authorities of relevant organizations is less efficient and need an improvement (Warraich et al., 2011).

4.12.5 Wasting of Productive Time of farming

The upshot of data reflected for wasting of productive time of crop, seasonal small business and education is badly affected because of frequently floods in study area. $x^2 = 11.697$ and P–value = 0.0001 (<0.05) reflects an extremely high significant association with Wasting productive time of farming with flood as shown in Table 1. Finding highlight the disruption in financial inclusion in agricultural production and crop damage during and after floods (Sahu).

Table 4.2: Flood impact on vulnerable groups

Variables	Categories	Experience flood		Chi-square	P-values (2-sided)
		Yes (%)	No (%)		
Impact on Disable	Yes	118 (68%)	55(31%)	6.99	.004
	No	120 (73%)	44 (26%)		
Impact on Old Age	Yes	149 (71%)	60 (28%)	11.9	.001
	No	89 (69%)	39 (30%)		
Participation of Disaster related organization in Floods	Yes	110 (73%)	40 (26%)	9.57	.001
	No	128 (68%)	59 (31%)		
Household dependence on external Support	Yes	146 (70%)	61 (29%)	.002	1.000
	No	92 (71%)	38 (29%)		

4.13 **FLOOD IMPACTS ON VULNERABLE GROUPS**

Afterward analysis of the data it was also reveal the number of disables in community as shown in fig 1.10 i.e. 6.825% (1) and 24.33% (<1) in a H.H. As H.H head age described in fig 1.3 (<55) with 9.496% and the presence of old age people in some H.H in study area described as one (39.76%) and <1 with (39.17%).

4.13.1 Impact on Disables

It is point toward the result of respondents that In spite of having less number of disables persons in study area indicate middling level of disability in effected community. Overall result

show x^2= 6.99 and p = values = .004 (<0.05) a likeable significance association of floods and its impact on the disables as shown in table 2. Findings revealed that significant association indicate the lack of local institutions for handling the special groups at risk during flood. Apparently, emergence of this situation is under unsafe conditional threat (Rights, 2014).

4.13.2 Impact on Old-age

The result reveals the authenticity of flood impacts on old age groups. This consequence of data concluded from x^2= 11.9 and P-value = .001 (<0.05) indicate an extremely high significant association highlight the extreme vulnerabilities of old age regarding flood impacts. Finding revealed that social relations and public actions are responsible for their vulnerability and flood impacts (Cutter et al., 2000; Tuohy & Stephens, 2015).

4.13.3 Participation of disaster Related Organization

The interpretation of data in terms ofx^2= 9.57 and p-value=.001 (<0.05) indicated the positive and high significant association with participation of disaster related organization during floods in community but according to responses to some extent. Findings regarding outcome of data exposed that access to sources of information is not very frequent. Same as where access of information as 6.528 percent is very limited from disaster related organization, apparently participation of disaster related organization during flood is less active (Cuny, 1991).

4.13.4 Dependence of H.H on External support

Steadily according to past disaster events in area, result nailed out the dependency factor on external support at H.H level during flood. As x^2= .002 and p-value= 1.000 (>0.05) show no significant association of H.H dependency factor on external support with flood experience. Findings revealed about H.H reliance during floods is majorly focus on   primary action for continuation of livelihood as main sources of recovering from losses. Moreover, respondents be

contingent on selling their limited resources i.e. livestock, stockpile and jewelry who can afford and highlighted the respondents need ratio is more from relative funding. On other perspective, in the context of slow-onset floods, access to financial funds has helped effected households to respond to crucial financial needs due to flood impacts i.e. flood-related preparedness, the improvement of physical household assets, housing upgrading and livelihood diversification (Van Tuan, 2014).

4.13.5 Direct/ indirect Flood impacts on Health

Standardized evidences prove that flood put sever impacts on health facilities as this $x^2=$ 83.425 and P-value = .0001 (<0.05) indicate an extremely high significant association between health issues and flood impacts. But the facilities are not enough to handle his severity because there is no availability of proper health facility except quackery doctors (Atai doctors) in normal day and during flood. Quackishly treatments enable patience's to face sever diseases. Vulnerability of health factor is responsible for direct and indirect impacts from floods. These findings makes base and increases the vulnerability of the overall community.

Table 4.3: Flood impacts on health

Variable	Categories	Experienced Flood		Chi-square	P-value (2-sided)
		Yes (%)	No (%)		
Was there any damage to health facility	Yes	158 (80%)	39 (19%)	83.425	.0001
	No	42 (30%)	98 (70%)		
Any Disruption In Access to Health Services	Yes	143 (78%)	39 (21%)	12.049	.0005
	No	95 (61%)	60 (38%)		
Any of the H.H Member to Sick During the Floods	Yes	136 (78%)	37 (21%)	10.938	.0009
	No	102 (62%)	62 (37%)		
Main Source of water Affected By the Floods	Yes	142 (78%)	40 (22%)	4.673	.0306
	No	103 (66%)	52 (33%)		
Sanitary Facilities affected by Floods	Yes	136 (77%)	40 (22%)	8.518	.0035
	No	101 (62%)	60 (37%)		

4.14 DAMAGE TO HEALTH FACILITY

During floods, destruction to critical infrastructure is always remain under threat. Here data revealed that x^2= 85.949 and p-value=.0001 (<0.05) show an extremely significant association between flood and damage to available health facility. Availability of health facility is very limited in study area. Findings disclosed partial damage to limited health facilities i.e. dispensaries, limited access to lady health workers (LHVs) and no damage to health facility but indicate the indirect impact of limited or no access to health facility. On other hand, finding disclosed that the area is mostly saturated with illiterate people this point out the existence of large number of quackery doctors (Atai doctor).

4.14.1 Access to Health Services

The study revealed an extremely high significant association through x^2= 12.049 and p-value=.0005 (<0.05) the relation between disruption in access to health facility. This result ensure the findings of indirect access of effectees to health facility i.e. quackery doctors, LHVs and camp based doctors. Similarly, another aspect clearly indicate that access to health facility becomes very difficult during and after flood (Akbari, Farshad, & Asadi-Lari, 2004).

4.14.2 Health Problems

Consequences of results indicated prevalence of endemic diseases during and after flood. As mentioned in Table 3 the x^2=10.938 and p-value=.0009 (<0.05) shows an extremely high significant association with health problems during floods. Findings are relatively close to the unavailability of proper health facility. Furthermore, chi-square and p-value describe a significant association about respondents which faced direct/indirect impact offload. More common health problems revealed diseases like Malaria, itching, Diarrhea, Measles and Depression by upshot of data (Watson, Gayer, & Connolly, 2007;Eric J Crighton, Elliott, van der Meer, Small, & Upshur, 2003).

4.14.3 Affected Main Water Resources and Sanitary Facilities:

As results indicated about 78 percent main sources of water affected by floods as shown in fig 1.20. The relation from x^2=4.673and p-value= .0306 (<0.05) shows significant association. Similarly results 77 percent achieved on sanitary facilities affected by floods as the value of Chi-square=8.518 and p-value=.0035 (<0.05) shows a high significant association between sanitary facilities affected by floods. Upshot of data disclosed ascending unhygienic conditions in terms of frequent flooding as shown in table 3. This association revealed finding about extensive use of open air for sanitary purpose and pond of flood water for domestic are the basic outcomes of health problems as shown in fig 4.21 (Watson, Gayer, & Connolly, 2007).

Table 4.4: Flood impacts on education

Variable	Categories	Experienced Flood		Chi-square	P-value (2-sided)
		Yes (%)	No (%)		
Was there any damage to school infrastructure	Yes	154 (78%)	42 (21%)	20.67	.0001
	No	78 (55%)	63 (44%)		
School Going Children in Your H.H Experience any Disruption in an attendance	Yes	143 (78%)	39 (21%)	12.049	.0005
	No	95 (61%)	60 (38%)		
Main Reason of Attendance Disruption	Roads impassible	37 (78%)	10 (21%)	9.57	.001
	Roads washed away or submerged	120 (71%)	47 (28%)		
	School Surrounds with water	81 (65%)	42 (34%)		

4.15 DAMAGE TO SCHOOL INFRASTRUCTURE

Here the interpretation indicate about 78 percent direct impact of flood and cause damage to school infrastructure through x^2=20.67 and P-value=.0001(<0.05) show an extremely high significant association between flood impacts on school infrastructure. Finding revealed that damaged to school infrastructure lead an apathy factor from respondents which create a long pause for children in education steaming and awareness.

Education is the key component of sustainable development. Destruction of such critical infrastructure create a long pause for streaming in education. Disaster awareness depends mostly on education (Birkmann et al., 2016).

4.15.1 During flood School going Children Faced Disruption

School going children faced 78 percent direct disruption in attendance during and after floods. As damage to school infrastructure directly impact on number of school going children. Furthermore, the result indicate an extremely high significant association from x^2=12.049 and P-value= .0005 (<0.05) in attendance disruption of school going children from schools during and after flood as shown in table 4.

Finding elaborate the facts regarding results and observation about those aspects which really need a solution. For a long time period unfortunate distance of from education develop no interest in studies. This frequent flood situation lead children effectees left the school (Azad, Hossain, & Nasreen, 2013).

4.15.2 Main Reasons of Attendance Disruption

The upshot of data about main reasons of attendance disruption is appropriately 71 percent faced indirect impacts and 65 percent faced direct impacts of flood. This show a significant association through x^2=9.57 and P-value=.001(<0.05) from schools during and after flood and cause to generate the vulnerability (Cutter, Mitchell, & Scott, 2000). As finding nailed out the main reasons of disruption as wash away and submerged the school infrastructure and roads(Cyr, 2005). Furthermore, fact of this disruption is disclosed because of schools surrounds/ inundated for a long time with flood water as shown in table 4.

Table 4.5: Flood impacts on housing and agriculture

Variable	Categories	Experience Flood		Chi-square	P-value (2-Sided)
		Yes (%)	No (%)		
Did your House collapse Due to Floods	No Damage	37 (78%)	10 (21%)	9.57	.001
	Partial Damage	120 (71%)	47 (28%)		
	Complete Damage	81 (65%)	42 (34%)		
Collapsed Household forced you to relocate new area	Yes	91 (68%)	41 (31%)	27.9	.000
	No	147 (71%)	58 (28%)		
Impact on Property assets	Food items	89(77%)	26 (22%)	11.905	.002
	Livestock	82 (70%)	35 (29%)		
	H.H. Items	67 (63%)	38 (36%)		
H.H Experience Crop Damage During Floods	Yes	102 (73%)	37 (26%)	6.16	.013
	No	136 (68%)	62 (31%)		
Experience Loss of Food stock	Yes	140 (82%)	30 (18%)	22.7	.000
	No	98 (58%)	69 (42%)		

4.16 HOUSE COLLAPSED

Frequently occurrence of flood and extent of damage to property indicate 65 percent response for completely damage houses (Kacha) and 71 percent for partially damage (semi Pakka) houses. The consequences of this analysis in (Table 5) highlights the x^2=9.57 and p –value= .001 (<0.05) show very significant association between direct impact of flood with damaged houses. Furthermore, this finding is clearly associate with ground realities of damage extent at household level as shown in Fig 1.8.

4.16.1 Damaged House Forced to Relocate

This finding that In spite of facing direct and indirect impact of flood indicated about 71 percent responses does not forced them to relocate towards new area. Results revealed an extremely high significant association established asx^2=27.9 and P-value = .000 (<0.05) as between 68 Percent forced location on complete damage and the main reason is 71 percent stick to native land is in their priority. Results indicated at a glance, due to direct impact of flood effectees are compelled to live in a nomads like settlements (Terry Cannon, 2000).

4.16.2 Damage to Property Assets

Property assets (see page 10) include food items, livestock and H.H items. Number of respondents faced 77 percent direct impacts of flood in food items, sought out through consequences of analysis. On the other hand, number of respondents faced indirect impacts as shown in Table 5. An extreme significant association is established through x^2=11.905 and p-value=.002 (<0.05) between property assets by direct and indirect impacts of flood (Burningham, Fielding, & Thrush, 2008).

4.16.3 Crop Damage

The upshot of data highlights the damage capacity of crop about 73 percent through direct and indirect impacts from frequent floods. The importance of crop in fig 1.9 and its presence socially and economically has a pivotal role. Agriculture in major countries stands as a back bone for economic stability(Cui et al., 2018). Table 5 shows a significant association as x^2= 6.16 and p-value = .013 (<0.05) indicate relative finding of direct and indirect impacts between flood and crop damage.

Agriculture is the transcendent livelihood strategy for people in this area and the most important activity in terms of spatial extent. About 80 percent of the inhabitants of this region is engaged in farming and depends mainly on natural soil fertility with limited external inputs such as inorganic fertilizers (Van Tuan, 2014).

4.16.4 Damage to Food Stock

Damages in food stock indicated 82 percent losses in food stock during and after floorshows an extremely high significant association in x^2 = 22.7 and P- value = .000 (<0.05). This finding highlight the direct impact of flood that faced by effectees in flood designated cluster. In food stock (wheat stock) play a vital role which damaged highly as describe in fig 1.9. This

situation become worst because of frequent flooding(Van Tuan, 2014). Finding of an extreme association between food stock and flood disclose after effects in terms of poverty and health problems which makes the root causes of vulnerability as shown in Table 5.

Table 4.6: Household income

Variables	M	N	Std. D	Std. E.M
Household Income Before Floods?	18281.8991	337	9047.52985	492.85036
Household Income After Floods?	10459.9614	337	6952.55238	378.72966
Level of significance ±1.96 interpret strong association with financial problem by H.H income with floods experiences	Pair- t Test =21.47			
	Degree of freedom= 336			
	Sign. (2-tailed)=.000			

Descriptive sample of Pair-t Test	M	Std.	Std. M	95% confidence interval of the difference		t	df	Sig. (2tailed)
				Lower	Upper			
Household income Before and after floods	7821.93	6687.15	364.27	7105.39	8538.47	21.47	336	.000

4.17 HOUSEHOLD INCOME AND POVERTY

Economic resilience of a community play a key role in recovery phase. This analysis make us able to know the economic resilience of the study area for timely recovery. Statistically analyzing of household income from study area, specify from the mean of the data here mean 7821.93 reveal significant low income after floods. Similarly the standard deviation 6687.15 show relatively significance level of impacted H.H income with t=21.47 through mean value. The inference of data shows that t statistic and degree of freedom with p-value=.000($<$0.05) indicate an extremely significant association of flood with lower H.H income after flood as shown in Table 6. This shows extremely significant association and the rejection of Ho hypothesis. This relation put an arrow towards flood impact for decreasing the H.H income as described statistically in Table 6.

Mean indicated a finding of about very low income level in some families from the number of respondents that forced them to live in a poverty.

4.17.1 Indirect financial Problems

Statistically discussed scenario highlight some indirect financial hurdles that need more effort towards Sustainability with limited resources. Major hurdle face by H.H in reconstruction of Houses when they lost it completely. When limited H.H income shacked through flood. This financial hurdle in affected communities were make them unable to handle and construct their houses. During this creates a big gap in relief and recovery through timely response. Response is an immediate source to handle the relief and recovery activities effectively. "Response" through spread awareness, education, health based activities, construction of dykes and levees, flood zoning to high light flood regions and then get help through relative department for nail out the vulnerability of that community from quick availability of relevant data and much more. If this gap will be sort out before the disaster happened then many problem will be handle progressively (Sandhu, Lodhi, & Memon, 2011).

4.18 **FINDINGSS**

- Kundai, Kotla Ghulam Shah, Sarki, Khan Ghar Doma were analyzed to assess the vulnerabilities in the context of socioeconomic due to flood hazards. Unfortunately people are living in such flood zones where they experienced floods very frequently also no significant socioeconomic growth observed and there is very limited resources. Therefore the communities were not resilient towards disasters. 88% respondents were living in flood zone area directly affected by the flood.

- The community where the percentage of illiteracy is 44.81% and there is no specific education to cope up from such disastrous situation. The government disaster related organization not play a very significant role in this manner.

- In the flood affected zone it was observed that 59% females are most vulnerable towards floods because of their families having children consisted of more than 10 (29%), including physically fragile and number of dependents people i.e. old age above 1 (39%) and disables ≥1 were 30%.

- Vulnerability has a direct correlation with physical structure and livelihood patterns. Structural material is an important fact that can help to increase the risk and may also contribute to decrease risk. Reported number of houses in which 37% were Kacha houses and 42% were semi Pakka houses as the underlying causes of vulnerability were 32% residing in flood prone areas although 27% lacking of alternative resources and a major cause to increase the vulnerability was 42%.

- It was analyzed that the community suffered many diseases about 37% respondents were affected by Malaria, itching, diarrhea and measles due to adverse water and sanitation problems where 45% people were compelled to use water from flooded ponds for drinking and household purposes. Due to the unavailability of health facilities the community become more vulnerable towards hazards.

- For the recovery and rehabilitation of their livelihood, affected communities reported that they do not get much support from government and other organizations. Most of them about 45% get support from their relatives for their recovery, also they sold their assets like jewelry (8.6%) livestock (47%) and stockpiles (43.62%) for their recovery and rehabilitation.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSION

Vulnerability assessment is a tool of decision-making of particular stakeholders about disaster risk reduction. In this study, vulnerability assessment for multiple hazards in a specific area Village community has been done incorporating sensitivity and exposure to hazard with subtracting of coping capacity in area. Statistical tables have been draw from the findings of the vulnerability assessment. From the analyze data one can understand vulnerability scenario for multiple hazard, vulnerability should be enhance when sensitive community face hazard with lack of capacity.

These assessments usually emphasis the sensitivity and exposure condition of communities and the characteristics of a society that increase the effects of extreme natural hazards. Therefore, this study provides a base that, in order to improve vulnerability assessments in district Village community, a more integrated approach must be embraced. By combining physical and socio economic vulnerabilities to a variety of natural hazards at the district and union council levels a better understanding of place-based vulnerability assessment will hopefully be attained. The research thus attempts to advance the body of vulnerability research by developing a multi-hazards assessment method for Village community.

5.2 RECOMMENDATION

Proposed guidelines to mitigate vulnerability:

- Education provide technical training to Household (male, female) to improve their socioeconomic standards. Social learning occurs, there is a greater likelihood that Mitigation and preparedness will be improved.

- They should build their houses at some height from the ground level to minimize the effects of floods.

- Improve the education facilities and provide awareness about flood zones and guide them to relocate

- Government through agricultural departments educate the rural communities about flood prone areas to cultivate flood resilient crop. Social learning occurs when beneficial impromptu actions are formalized into institutional policy for handling future events and is particularly important because individual memory is subject to decay over time. Manifestations of social learning include policy making and pre-event preparedness improvements.

- Technical skill for coping with flood would reduce the duisaster risk reduction

- The sudy area has not any knowledge about flood managemen, lesson should be include in text books to inhance the knowledge about flood risk reduction

- Disaster management relevent organisation would conduct sesons to enhance the level of awareness

- Due to poor flood warning system the area face high impacts of flood, regullere flood warning system would increase gap time for saving valuable property and lives

- Poor influence in decision making process in study area were cause many losses, CBOs commuunity base organisation would effective for proper decision making in flood.

- Agriculture almost effect intensively in flood, Some of the population in town two depends on agriculture, which is highly sensitive to the impacts of flood hazards, sustained efforts should

be made to increase the ability of the agricultural sector to withstand the effects of natural hazards.

- Governmnet should involved local community represntative (CBOs) for flood risk reduction startigies, local community is the first respondent incase of flood

- Additionally, to test the method presented here, similar research could be undertaken in other parts of the country, or for the entire country. Similar study would caried out at other part of provinces.