Flood Risk Management through Community Resilience: A Case Study of District Layyah in Punjab, Pakistan

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THESIS ACCEPTANCE CERTIFICATE

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This thesis is dedicated to my loving parents

who never stop of giving themselves in number of ways and

beloved brothers Syed Abad & Syed Awad

The symbols of love & sacrifice!

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List of Acronyms

GHG	Green House Gases
DRR	Disaster Risk Reduction
FRM	Flood Risk Management
UC	Union Council
NGO	Non-Governmental Organization
DDMA	District Disaster Management Authority

Abstract

Floods occurring along river Indus in Pakistan caused catastrophic havoc in August 2010 causing number of fatalities and economic losses. These losses are larger in developing countries than in developed countries as developed world has larger recovery capacity and better early warning systems in place. Human settlements are getting closer to the flood plains of river channels due to which communities are more vulnerable to floods. Understanding the flood risk is very crucial to manage the impacts of flooding and in making better and timely decisions. Flood risk management stands in need of a strategy that can stabilize the sustainability with present needs. For seeking understanding of flood challenges due to intensity of flooding impacts, there is a need to enhance the policies, technical knowledge and strategies. And, it can be achieved through coordinated struggle of national and international bodies. Now there is a need for systematic assessment at local level and for more featured datasets and analysis of the flood risk areas. Mix research design was used in research to provide coping strategies towards flood challenges, elaborates the community awareness and preparedness level, satisfaction level against government and NGOs role and present concerns regarding flood risks. Also, investigates the issues pertaining to role of local government institutions and national, international and local organizations which based on the review of the flood risk management in riverine area of district Layyah via in-depth interviews with government and NGOs officials. The study eventually formulates recommendations for the flood risk management and resilience building of communities at local level. These strategies will be a key input into the future development plans and regional planning guidelines. The research also helps the Layyah city local government and community development department to evaluate their system's performance and make their governance more efficient.

Chapter 1

INTRODUCTION

Floods are a natural part of the hydrological cycle which causes pervasive devastation, economic losses and casualties. However, flooding also induces many benefits as they renew the soil fertility in floodplains and adds value to the annual production of the crops. Moreover, beneficial to livelihoods of humans affiliated with waters, such as increase in boat builders' business in Bangladesh where flooding boosts the water transportation(Parker, 2000).Flooding is the most frequent among all natural disasters. Amongst all natural disasters, floods are most common and habitual. The number of reported floods has been increasing significantly in the past twenty years(Jha, Bloch, & Lamond, 2012). During the last few decades, flood disaster has become more intense despite vast experience in flood management(Parker, 2000). While, the reasons behind severity of flood damages are climate change, unsustainable development and population growth (Kundzewicz & Kaczmarek, 2000).

On the other hand, excessive emissions of GHG in the atmosphere are responsible for the global climatological changes. The climatic changes are manifestation of an increasing likelihood of extreme weather conditions around the globe. Climatic changes have impacts on city's future spatial patterns, growth and development (Prasad et al., 2009, p. 5). Meanwhile, mitigation and adaptation strategies are necessary to reduce the risks arising due to climatic changes.

Floods cause major disruption to many life activities and businesses. Among these services, transport, education, accommodation, water supply and drainage provision are essential. Equally, floods have wider impacts on population of city. As a matter of fact, number of fatalities and economic losses are larger in developing countries than in developed countries as developed world has larger recovery capacity and better early warning systems in place. The largest share of an economy and population of Cambodia, Bangladesh and Vietnam is exposed to floods (Kundzewicz et al., 2014, p. 4). Considerable number of people started living in the cities, suburbs and flood prone areas along the rivers which ultimately enhance their vulnerability towards natural hazards and alarming climatic changes around the world. It is also estimated that 61 percent population of world will live in cities by 2030 (Prasad et al., 2008). It is evident that persistent urban growth and shortage of diligent planning boost cities vulnerability for flood disasters (Restemeyer, Woltjer, & van den Brink, 2015, p. 45).

The understanding the flood risk is very crucial to manage the impacts of flooding and in making better and timely decisions to address such impacts. Flood risk definition defined by European Flood Directive (2007) as "the combination of the probability of a flood event and the potential adverse impacts on human health, the environment, cultural heritage and economic activity associated with a flood event"(Velasco, Cabello, & Russo, 2016, p. 426). Flood risk management is described in terms of risk, hazard, vulnerability, exposure, resistance, resilience, coping and adaptive capacity of communities. Flood risk management stands in need of a strategy that can stabilize the sustainability with present needs. So, the integrated flood risk management includes a combination of both measures that are

structural and non-structural (Jha et al., 2012). Structural measures include river defenses such as construction of levees, dams, dikes and channelization. While nonstructural measures reduce the impacts of floods and vulnerability of people and communities with the help of early flood warning systems, flood emergency response, Disaster Risk Reduction and evacuation schemes. To sum up, resilient flood risk management strategy considerate on reducing the impacts of floods via efficient warning system, evacuation plans and building regulations in flood prone areas(Vis, Klijn, De Bruijn, & Van Buuren, 2003). Therefore, hampering of floods is difficult but damages and exposure of flooding to risk lain communities can be minimized with flood risk management. Despite of being protected by flood control infrastructures, such as levees, dams and channelization; river cities face the challenge of flood hazards. Flood control infrastructure is not a reliable and sustainable mitigation approach in the face of climatic change uncertainties, hence an alternative mitigation approach is needed which can be achieved by focusing on the concept of resilience(Liao, 2012).

Resilience is defined as "the capacity of ecosystems, individuals organizations or materials to cope with disruption and stress and retain or subsequently regain functional capacity and form" (Stead, 2014). Moreover, a resilient system by War Dekker et al. (2010) is described as " a system that can tolerate disturbances (events and trends) through characteristics or measures that limit their impacts, by reducing or counteracting damage and disruption, and allow the system to respond, recover, and adapt quickly to such disturbances" (Stead, 2014). In order to make a flood resilient city, planners need to figure out the ramifications of flooding. Resilience strategies strive for minimizing the negative

impacts of flooding and lean on risk management rather than hazard control(Vis et al., 2003, p. 33). Hence, Resilience Building is defined by UNDP as a "transformative process of strengthening the capacity of men, women, communities, institutions, and countries to anticipate, prevent, recover from and transform in the aftermath of shocks, stresses and change"(UN, 2009).

1.1 PROBLEM STATEMENT

Human settlements are getting closer to the flood plains of river channels due to which communities are more vulnerable to floods. The extent to which communities are vulnerable to disaster is not only due to the precipitation but influenced by many other factors such as lower socio economic status, low quality building stock, poor quality and ill maintained infrastructure, poor drainage system and lower awareness of communities regarding flood preparedness. However, vulnerability can be reduced with the help of cooperative ability of stakeholders and institutions to address the challenges.

"Living with floods" is an ancient philosophy and still practiced today in rural communities of Bangladesh, Cambodia and Egypt (Liao, 2012). Many studies have revealed that communities adapted to shocks and disturbances rather than resistant are more durable(Liao, 2012). For getting a normal life back after shock or stress, many years are required due to which disaster knocked areas remain lagging behind. In short, disasters place pressure on individual, community, local and state economies. For seeking understanding of flood challenges due to intensity of flooding impacts, there is a need to enhance the policies, technical knowledge and strategies. And, it can be achieved through coordinated struggle of national and

international bodies (Djordjević, Butler, Gourbesville, Mark, & Pasche, 2011). Nowadays, decentralization is a continuing urge in Asia which speaks for the radical change in the approach for managing cities. Local governments should be capable of taking responsibilities and must aware of knowledge and capabilities of self-management (Djordjević et al., 2011). Now there is a need for systematic assessment at local level and for more featured datasets and analysis of the flood risk areas. This research provides coping strategies towards flood challenges, elaborates the community awareness and level of preparedness. Also, investigates the issues and bottlenecks pertaining to role of local government institutions and national, international and local organizations which are based on the review of the flood risk management in riverine area District Layyah.

1.2 JUSTIFICATION

There has been a shift over the past decades, from structural flood defensive measures towards integrated flood risk management (FRM). The Directive declared that flood management plans demand for the identification of tangible and non-tangible measures which are efficient enough to lessen the vulnerability to floods and upgrade the governance for flood risk (Schelfaut et al., 2011). Hence the study identifies the responsibilities of public institutions and private stakeholders which are divided from organizational point of view. The study recognizes the potential strategies and measures to build a city flood resilient.

Case study District Layyah is chosen because it is located in South Punjab which is least developed area and subject to annual flooding. Historically, people of Layyah District are riverine people as earliest colonies built up on the bank of

River Indus that crosses nearby. Floods become a common feature in the lives of a significant number of citizens of Layyah. Seasonal Monsoon rainfall coupled with other local factors such a poor drainage, poverty, negligence of local government institutions towards flood risk management which cause damage to properties, loss of livestock, crops, livelihood and also loss of lives of citizens. The study eventually formulates guidelines/recommendations for the flood risk management at local level, Disaster Risk Reduction strategies and post flood rehabilitation of victims. These strategies will be a key input into the future development plans and regional planning guidelines. From one of the prime concerns for disaster risk reduction globally; enhancing the community resilience is most influencing factor as concluded by 2009 Global Platform for Disaster Risk (Schelfaut et al., 2011). The study provide measures and strategies to elevate community awareness level of communities and mitigation approaches of flood as the information and the capacity needed for the communities to meet the disaster challenges are lacking in case study area. As an idea of Community resilience to disasters has gained significant impact in the last decade which help policy makers and practitioners to identify the strengths and vulnerabilities of particular populations endangered by foods(Walters, 2015). The research also helps the Layyah City Local Government and Community Development Department to evaluate their system's performance and make their governance more efficient.

1.3 RESEARCH OBJECTIVES

Following are the main objectives of the Research:

- The main objective of research is to assess Flood Risk Management and Resilience Building Practices in flood prone communities of case study area in the aftermath of 2010 flood.

1) To assess damages in flood prone communities
2) To examine the resilience building practices of local communities
3) To examine the role of Local Government for flood risk management and resilience building
4) To examine the role of NGOs for flood risk management and resilience building
5) To give recommendations for enhancement of community resilience and flood risk management

1.4 RESEARCH QUESTION

Below are the research questions related to each of the research objectives

1) What were the indigenous practices that helped in resilience building of community?
2) What were the damages caused by 2010 floods in vulnerable communities?
3) What was the role of Government Institutions during and post 2010 flood event?
4) How did the NGO sector play its role during and post 2010 flood event?

5) What were the major constraints in government Institutional setup identified by the government and NGOs officials for tackling the disaster management challenges
6) What were the major constraints in NGO sector identified by the government and NGOs officials for tackling the disaster management challenges?

1.5 SCOPE AND LIMITATIONS

To understand the Flood Risk Management completely, to access the resilience building practices and to examine the role of Government and NGOs in District Layyah; it would have been better to study the other victim Districts of Punjab like D.G Khan &Muzaffargarh etc. However, due to limited time and limited financial and human resources, riverine belt of Layyah District was selected as a case study area which was mostly devastated in 2010 flood event.

Chapter 2

LITERATURE REVIEW

2.1 NATURAL HAZARD

ISDR defined natural hazard as natural procedure that can cause life loss, injury, damage to property, social and economic life, disruption of services, follows:

> *"Natural procedure process or phenomenon that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage"* (ISDR, 2009).

When hazard causes loss of human life, livelihoods, social and ecological systems, it becomes a disaster.

Given by ISDR, disaster definition is as follows:

"A serious disruption of the functioning of a community or a society involving widespreadhuman, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources" (ISDR, 2009).

2.1.1 Floods: Devastating Natural Hazard

Floods are one of the most periodically occurring hazards around the globe which cause tremendous infrastructure damage, injuries and deaths. According to (Li et al., 2016) community flood disaster risk management rely on the role and participation of local stakeholders. Moreover, these participatory approaches and GIS are used to attain local knowledge about hazard intensity, vulnerability, and resilience measures as well as to generate risk maps. The community-based disaster risk management has been severally underlined in the Hyogo Framework for Action 2005–2015 and the Sendai Framework for Disaster Risk Reduction 2015–2030. Additionally, many local governments and non-government organizations, such as United Nations Development Programme and Asian Disaster Preparedness Center have implemented it(Li, Xu, & Wen, 2016). Apart from this the 2009 Global Platform for Disaster Risk Reduction deduced that the strengthening of community resilience is one of the priority areas for disaster risk reduction around the globe (Schelfaut et al., 2011).

2.2 INTEGRATED FLOOD RISK MANAGEMENT

Flood risk management needs the collaboration of various tasks incorporating development planning of development, land use management, community participation, flood warning and physical infrastructure to enhance community resilience and lower the flood risk. While, integrated flood risk management implies that resilience is the ability of institutions, communities and individuals to endure, adapt and rise after shocks. Hence, adaptive capacity is major concept for building resilience (Brears, 2015).

2.2.1 Flood Resilience Practice into Flood Risk Management

Holling defined resilience in 1973 as the measure of the endurance of the system and its ability to take over the change and perturbation and still manage the same relationship between community and state variables (Vis et al., 2003). While, resilience is not only the capacity of the system to return to its original state but to do advancement in it by learning from past experiences and adaptation (Cutter et al., 2008). Similarly, resilience is also defined by Bruijn and Klijn in terms of flood risk management and it focuses on minimization of impacts by living with floods instead of fighting with them (Vis et al., 2003).Flood risk management approach recognizes that floods cannot be stopped from occurring. In contrast, it emphasis on how to reduce hardship and vulnerability of risk prone communities(Schelfaut et al., 2011). Resilience concept has acquired importance under the notion the United Nations Hyogo Framework for Action (HFA)(Schelfaut et al., 2011).

2.2.2 Resilience Indicators in Context of Flood Risk Management

The study by (Schelfaut et al., 2011)contributes towards tackling challenges and adds details about the opportunities and ways to promote resilience and truly bring it into practice. This is based on a review about the management of flood in three separate case studies in Europe. These include the Calabria (Italy), Flanders (Belgium) and Niedersachsen (Germany). Flanders and Niedersachsen were prone to fluvial floods while Calabria often triggered by flash floods. An in-depth analysis of the risks and flood situations by the risk management institutions has provided details about these case study areas. Qualitative analysis of the current practices in the three mentioned study areas in regards to their flood resilience provided a thorough comparison. After that the structured questionnaires discussed

with the experts and conducting surveys with the residents who were exposed to the risks can help in verifying and can complement the qualitative results with the help of quantitative data. The findings of study highlight resilient relevant measures and factors. It is revealed that participation of all stakeholders and communities enhance the resilience against flood. They are well-prepared, better aware and quite knowledgeable about the risks and respond much better in case of a flood. Also, they recover quickly from the negative impacts of the event. Resilient communities improve their capacity of dealing with adversaries at each step of Flood management cycle. Among the plausible explanation for these findings are resilience indicators in context of flood risk management. The utilization of the different tools for flood management, like the management plans and the early warning systems can act as catalysts towards increasing the awareness and preparedness. Similarly, risk communication during event falls under the domain of risk communication and perception. Moreover, Institutional cooperation and coordination, preparation of emergency services and spatial planning are primary indicators for resilience of policies and institutions (Schelfaut et al., 2011).

2.2.3 Social Resilience Indicators for Pre, Post and During Disaster Phases

The findings of Schelfaut is consistent with the study by (Khalili, Harre, & Morley, 2015). The researchers used "Yin" case study approach to identify the social resilience indicators. Therefore, the objectives of this study were to (i) identify the most immanent social resilience indicators within communities from previous studies (ii) rank these indicators for each phase of the disaster cycle. Interestingly, the results of this study provide a unique framework for social

resilience to enhance within communities in different phases of disaster cycle. In the purposed framework, all indicators have been identified by their level of impact on social resilience. It is apparent from the fig 1 that plans and strategies can be devised in each phase of disaster which consequently leads to measurement of social resilience. The framework is a two dimensional matrix that shows different indicators in all phases of disaster and their impact level on social resilience. Further research to assess these indicators quantitatively and explore impacts of social network on social resilience would be of great help in flood risk management.

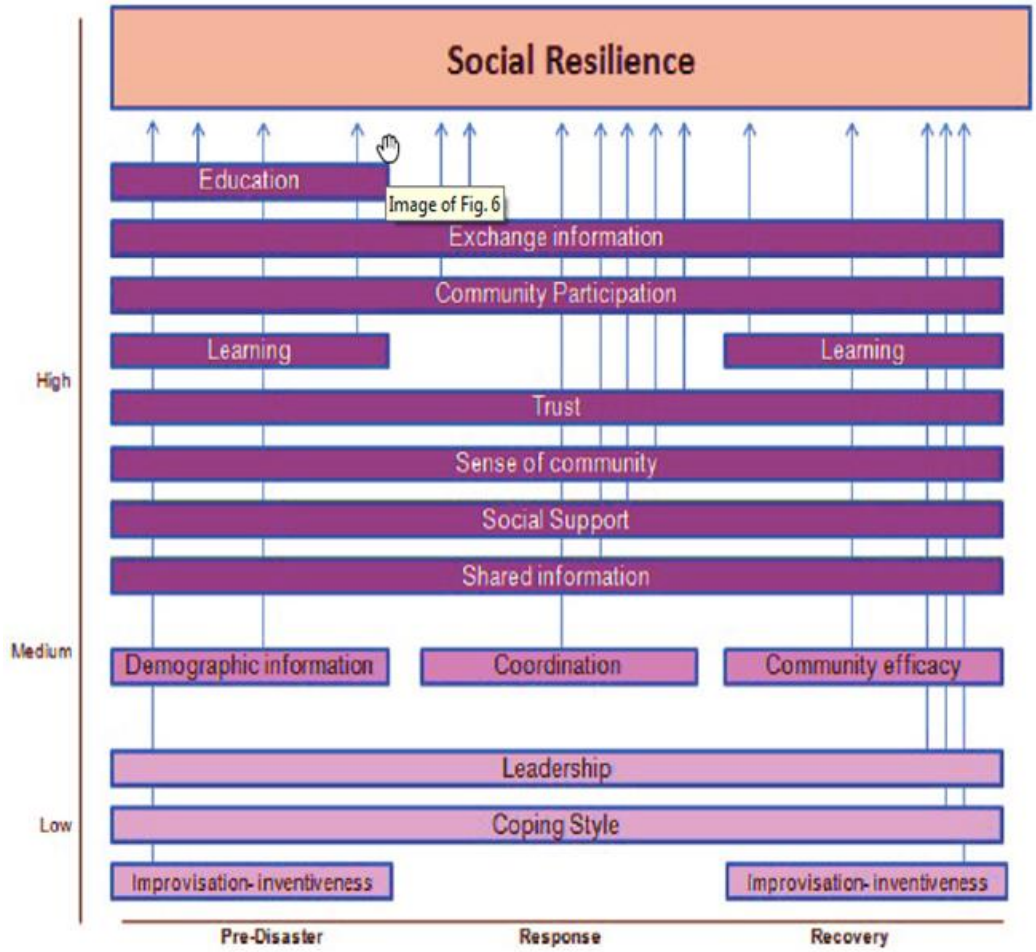

Figure 1: Proposed framework of social resilience

Source: (Khalili et al., 2015)

2.2.4 Economic Resilience: Core for Disaster Recovery Model

A sustainable recovery model provides economic opportunities to rebuild assets and strengthen earning capabilities. Such a model considers the appropriate local scenario, living skills and experiences of vulnerable population (Commission, 2009). Moreover, occupational resilience model targets multiple goals of delivering employment possibilities with stable income, repairing or rebuilding of assets, reducing recovery time and limiting migration for sake of employment opportunities (Srivastava & Shaw, 2014, 2015).

2.3 MEASURES TO INCREASE FLOOD RESILIENCE

Measures to increase flood resilience tie in with community awareness of and preparedness for flood. Examples of measures to increase flood resilience tie in with community awareness and better preparation. For instance, supply of sand bags, Building the houses on elevated platform, not storing food in the basement, evacuation plans, knowing the early warning and emergency procedures. As it is stated by one of the science policy reports that reducing risk is main component to enhance resilience (Society, 2014). Communities must become aware of the flood hazard and take measures to protect themselves as they can anticipate against floods. Not only do the individuals should have known about risks to, also government has acknowledged this and take relevant measures. Furthermore, risk analysis and policy making provide a basis for understanding and anticipating public responses to flood hazard by improving the communication amongst local people, professionals and decision makers. Communication should include the promotion of awareness and preparedness. It should include correct information on

flood risks, during crisis, announcing alerts and emergency decisions. Hence, risk perception is a product of risk communication and it shows how local residents apprehend the risk (Schelfaut et al., 2011).

The utilization of different flood management tools, like early warning systems and flood management Plans act as catalysts to increase the preparedness therefore enhance the resilience of local authorities and communities. Another study was carried out by (Cutter et al., 2008) to devise a framework to reform the comparative assessments of disaster resilience at local or community level and also provide set of variables for its implementation.

The measures listed below in Table 2-1 are best practices and experiences drawn-up from the immense past and ongoing research.

Table 2-1: Measures to increase resilience

Source: (Schelfaut et al., 2011)

Domain	Measures
Risk communication & perception	Residents: strategies for risk communication e.g. targeted campaigns to vulnerable groups, casual ways of communication and collaboration. Authorities: risk communication, e.g. training, capacity building, and guidance documents, actively involve stakeholders and community.
Flood management tools	Residents: promote community action, take measures before flooding (Sandbags, elevated platforms for food storage etc.) Authorities: plan dikes, levees, dams, technical development of tools, increased utilization of tools, capacity building on warnings, guidance documents, provide guidance on flood resilient constructions.

In 1994, first UN World Conference was held in Yokohama, Japan that addressed the disaster risk reduction and the social perspectives of vulnerability. After this, Millennium Development Goals became the benchmark in 2002 for finding an integral link to reduce natural disasters and poverty. As a result, Natural Disasters Risk Reduction has found its place in Sustainable Development Goals. Moreover, the Hyogo World Conference on Disaster Risk Reduction was held in Kobe, Japan in 2005. "The Hyogo Framework for action recognized the need for and established ways to build Resilient Communities by 1) integrating disaster prevention, mitigation, preparedness and vulnerability reduction prospects into sustainable development policies; 2) increasing local capacity (institutions and mechanisms) for building hazard resilience 3) incorporating risk reduction into the design and implementation of emergency preparedness, response, recovery and reconstruction schedule" (Cutter et al., 2008).

2.4 FLOODS IN PAKISTAN

Floods happened along river Indus in Pakistan caused catastrophic havoc in August 2010. Furthermore, flood events in Australia, Philippines, Sri Lanka and Thailand in 2010 and 2011 ended in drastic annihilation(Jha et al., 2012)."About 38 percent of population of the world live in areas that are greatly susceptible to floods and about 70 million on average of those affected by floods each year (Klijn, Merz, Penning-Rowsell, & Kundzewicz, 2015, p. 838). Below table shows the effects of significant flood happenings that influenced the cities in past decade.

Table 2-1: Major Floods between the era 2000-2010

Source:(Baker, 2012, p. 16)

Flooding Year	Country	Main Cities affected	Casualties	Total no. of affectees	Total Monetary loss (US$)
2005	India	Mumbai	1200	20,000,055	3.3 billion
2002	Germany	Dresden	27	330,108	11.6 billion
2010	China	Nanping, Guangxi, Fuzhou and Fujian	1691	134,0000,000	18 billion
2010	Pakistan	Peshawar, DG Khan, Chilas, Shukkur, Mingora, Thatta and Multan	1,985	18,102,327	9.5 billion

Floods 2010 in Pakistan According to (Deen, 2015), Pakistan has had seven major flood events which affect approximately 40million people since 1973. The2010 flood was referred as 'super flood' by the Government of Punjab. The flood accompanied the annual monsoon season and reached at unusual levels in the history of Indus River system in Pakistan. Moreover, 78 districts were overwhelmed. In Punjab, 200 villages, 500,000 homes, 1.7 million acres of farmland and billion dollars' worth of crops and livestock were destroyed (Deen, 2015).

In addition, it has been identified by (Deen, 2015) that people residing in rural areas are the most vulnerable group which is associated with agricultural sector, has low income status, minimal access to education, health services, water

supply and sanitation. In particular, the homes, infrastructure, transport system and schools of this vulnerable group have been destroyed due to 2010 super flood. Hence, it will have negative impact on Pakistan's Human Development Index which include access to education, health and public services as indicators (Deen, 2015). As stated by (Deen, 2015), in Human Development Report (2009) Pakistan's HDI was 0.572 ranking at 141 while Pakistan's GDP per capita was $955 ranking at 132nd out of 182 countries.

2.5 FLOOD MANAGEMENT IN PAKISTAN

According to (Tariq & van de Giesen, 2012), the flood management understanding comes under three aspects:

1) Flood management measures
2) Legislative framework
3) Institutional setup

2.5.1 Flood Management Measures

In Pakistan, flood management measures consist of flood protection structures like, spurs, levees and forecasting techniques. The FFC was established in 1977 under which first ten year NFPP was prepared. The NFPP-I had covered 350 food protection schemes (Tariq & van de Giesen, 2012). And now the new flood projects under FFC have criteria in which priority is given to need based measures for the socially and economically vulnerable local communities (Tariq & van de Giesen, 2012).

In addition, two types of measures are explained by (Tariq & van de Giesen, 2012) which are given below:

2.5.1.1 Structural measures

The flood management measures in our country largely relied on structural measures. In view of (Tariq & van de Giesen, 2012), structural measures consist of construction of embankments, spurs, dikes, leeves and flood water channels. Spurs are usually used to hinder the river erosion and bunds are constructed to protect towns, villages and irrigation. Annual report FFC (2008) shows that in Punjab, there were 294 spurs and 3334km embankments were constructed (Tariq & van de Giesen, 2012).

2.5.1.2 Non-structural measures

The transboundary issue of rivers has bounded the flood management options. Hence importance has been given to explicit flood forecasting and early warning system. Flood Forecasting Division of Pakistan Meteorological Department deals with flood warning and WAPDA helps to enhance the forecasting system. The flood early warning system was launched in 1975 and updated in 1998 by installing 22 high frequency radio sets to support automatic gauging and telemetry system (Tariq & van de Giesen, 2012).

2.5.2 Legal Framework

According to (Tariq & van de Giesen, 2012), legal framework for water management is carried out by WAPDA Act (1958), Environmental protection act (1997) and Indus River System Authority Act (1992). Emergency Services

Ordinance (2002) and National Disaster Management Ordinance (2006) has provided strategies to deal with emergency situation. The Ministry of Water and Power has developed a draft of National Water Policy in 2002 for floods in Pakistan. This policy has drawn attention towards the stakeholder participation and enhancement of community awareness for floods(Tariq & van de Giesen, 2012)

2.5.3 Institutional Framework

Federal and provincial institutions are involved in Flood Risk Management. In other words, risk managing institutes deal with structural and nonstructural measures in order to cope with flood while crisis managing institutes are involved in rehabilitation, relief and rescue and emergency operations(Tariq & van de Giesen, 2012).

2.5.3.1 Risk managing institutions

FFC has played vital role in flood management since its establishment in 1977. Flood protection plans and schemes are developed by provincial government under FFC. It also deals structural and other nonstructural measures like flood forecasting, early warning system, community awareness and preparedness. The Provincial Irrigation and Drainage Authorities produce flood emergency plans during pre and post flood events. In addition, this department plays its role in construction of flood protection infrastructure and flow magnitude in rivers and canals (Tariq & van de Giesen, 2012).

Similarly, WAPDA is responsible for flood forecast by presenting rain data from its telemetric gauge locations within the catchments of rivers. The Flood

Forecasting Division disseminate the flood warnings after getting and processing the data from various sources (Tariq & van de Giesen, 2012).

2.5.3.2 Crisis managing institutions

According to (Tariq & van de Giesen, 2012), divisional and district administrative bodies perform crisis management. The Provincial Relief Departments establish flood centers at district and union council levels through coordination of other government departments. Provincial and local governments provide emergency relief and basic necessities through Emergency Relief Cell. In addition, Army carry out relief and rescue operations during and after floods while provincial government provide the necessary equipment including life jackets, boats and tents(Tariq & van de Giesen, 2012).

Chapter 3

METHODOLOGY

This chapter briefly describes the research design, types of data collection, sample size, methodology to conduct the research and different types of data analysis techniques in order to achieve the objectives.

3.1 MIXED METHOD RESEARCH

Methodology of a research arranges what is to be examined and how it is done. Mixed research method enhances the reliability of research findings using both quantitative and qualitative data collection techniques.

Mixed method of research incorporate quantitative and qualitative procedures to give aggregate results related to complicated research questions (Lingard, Albert, & Levinson, 2008). Mix research design is used for this study because it is descriptive as well as exploratory research.

3.1.1 Descriptive Research Method

Descriptive research method attempts to present explanations for questions related to when, how, where and what of study. Descriptive research is applied to describe the major flaws in the flood response plans of Government and other non-governmental humanitarian sector during and post 2010 flood events and how did they play their role.

3.1.2 Exploratory Research Method

Exploratory research method is used to gain the background information and develop questions to be answered. Exploratory research is applied in this research to gain the knowledge of flood risk management and explore how to embed the flood risk reduction, mitigation and adaptation strategies to mainstream at local government and community development planning level. It also helps to investigate the structures if they are resilient against flood events.

3.2 CASE STUDY AREA

Layyah is a part of Thall desert. The River Indus flows on its western side in the direction from north to south. District Jhang is situated on east while district Bhakkar on its north side. Dera Ghazi Khan is located across the river and Muzaffargarh in the south of District Layyah. An area of District Layyah is 6291 Km^2 and includes three tehsils named as Tehsil Layyah, Tehsil Karor Lal Eason and Tehsil Chaubara ("District at a Glance Layyah", 1998). Karor Lal Eason and Layyah tehsils are situated on the left bank of river. Most of the parts of tehsils are irrigated by tube-wells and Peter/Pumps while $1/3^{rd}$ of both tehsils are irrigated by canals. As 44% of district consists of tehsil Chobara which is desert and thinly populated (Rural Development Policy Institute, 2013). Cultivation of gram is cash crop of area which mainly depends on sufficient rains although the rainfall pattern and climatic change is unpredictable. This adds to the livelihood and natural disaster vulnerability of the local communities.

The case study area selected to conduct the research in Riverine area of District Layyah. The research will contribute to the knowledge related to flood risk

management. Local Government and NGOs can use these strategies and recommendations for decision making so that resources can be allocated to finance measures for flood mitigation and adaptation. In Layyah, the selected case study area or sample villages were selected, using the convenience sampling technique, from among the most vulnerable villages where government and NGOs had implemented various flood risk management practices, relief, early recovery and response plans.

3.3 SAMPLE SIZE

Sample size was estimated by using Slovin's formula as shown below.

$$n = \frac{N}{1 + Ne^2}$$

Population of District as per 1998 census = N = 1,121,951

Marginal Error = e = 0.070

Sample Size = n = 204

Population sample was selected so the study will be free of any kind of bias. The questionnaires for community-based on literature review were distributed which consisted of both, open-ended and closed-ended questions to help in determining the socio-economic status of the local people, their concerns about the existing situation, their level of preparedness and construction patterns of their structures while living in flood prone areas.The four selected UCs included

Lohanch Nashaib, Bakhri Ahmed Khan, Kotla Haji Shah and Sahu Wala. Former three are part of Tehsil Layyah while the latter one is included in Tehsil Karor. Among 200 samples, there were 140 male respondents and 60 female respondents. Each questionnaire respondent was the head of his/her family.

3.4 DATA COLLECTION

This study derives information from two sources. Secondary research included a review and analysis of the existing literature on floods, disaster risk reduction, Community resilience, government documents and organization's annual reports and updates. The primary research involved interviews with key informants in the government and NGO sector who were responsible for DRR and resilience building of community against floods.

Two types of data will be collected for this research which is as follows:

i) Secondary data

ii) Primary data

3.4.1 Secondary Data

Secondary data was assembled by collected by reconsidering, investigating and examining government policies, schemes and response scenarios at local, national and international level. Organizations' reports and Government documents were utilized to get descriptive data of flood affected communities in case study area. This data had developed statement/story of study on the flood risk management structures in Layyah district which ultimately depicts the situation of disaster risk management in Pakistan. Available literature was studied thoroughly

and then used in literature review and in the development of questionnaires for the community and officials. Available literature helped in developing research questions and also helped to assess the capacity building needs for making people and infrastructure resilient against floods. Secondary information regarding the roles and responsibilities of the Government Institutions and NGOs was collected from the reports of previous studies, peer reviewed research papers, and reports published nationally and internationally, data provided by DDMA, NGOs and INGOs working in District Layyah. Primary data collected through interviews

3.4.2 Primary Data

Majorly primary data was collected through Survey and interviews. Field survey at different locations in the study area was conducted so that basic characteristics of the study area can be identified and analyzed. It is basically a questionnaire survey in selected union councils to get perception of the local people about their level of preparedness, role of government and NGOs in resilience building and their indigenous knowledge for flood risk management after 2010 floods.

3.5 DATA COLLECTION METHODS

Following methods were used for collection of data

3.5.1 Reconnaissance Survey

Reconnaissance survey was conducted to confirm that selected case study area is the most appropriate and needs an enhancement in flood tackling strategies. Reconnaissance survey represents a type of field survey that is often used to gather initial information regarding the historic flood events and gave the sufficient details

to make generalizations about the current flood risk management in case study area.

3.5.2 Interviews

Based on the background knowledge the interviews schedule was designed to explore attitude, perception and beliefs of 14 Government officials and 10 NGO representatives. Structured interviews comprise of questions helped in collecting their opinions regarding flood risk management issues and means to enhance the existing systems and strategies to face the challenges of floods. All the interviews were conducted face to face.

3.5.2.1 Government officials

Total 14 government officials were interviewed who work under DDMA in district Layyah. Their names and designations are given in Annexure.

3.5.2.2 NGOs officials

To know about the operating systems for the flood risk management; about the problems of the vulnerable communities to the disaster, their opinion and suggestions for the enhancement of resilience building and flood risk management in case study area. 10 NGO officials were structurally interviewed. Structured questionnaire was be used to get the required information. Their names and designations are provided in Annexure

3.6 DATA ANALYSIS AND COMPILATION

Data collected from all the sources was compiled and analyzed with the help of different software like Microsoft Office Excel and SPSS. Following types of data analysis methods were used to analyze the results and draw conclusions:

3.6.1 Quantitative Analysis

3.6.1.1 Descriptive analysis

In descriptive analysis, statistical data assists to illustrate the meaningful summary of facts and figures. For summarizing of group data, amalgam of tabular and graphical representation/depiction is useful along with descriptive narration. Hence, Quantitative input of data was processed in SPSS software to generate descriptive statistics which analyzed and identified the existing situation in case study area.

3.6.2 Qualitative Analysis

3.6.2.1 Content analysis

Content Analysis was performed in structured interviews as well as in selected literature to ascertain the flood risk management challenges faced by the government institutions NGOs and vulnerable communities. Analysis has provided the role of government and NGOs during and after 2010 floods and elaborate the issues that mar the floods risk management in case study area. After analysis of results, recommendations were given keeping in view the core concept of flood risk management. These recommendations are based on the results obtained through analysis of expert opinions.

3.7 FRAMEWORK

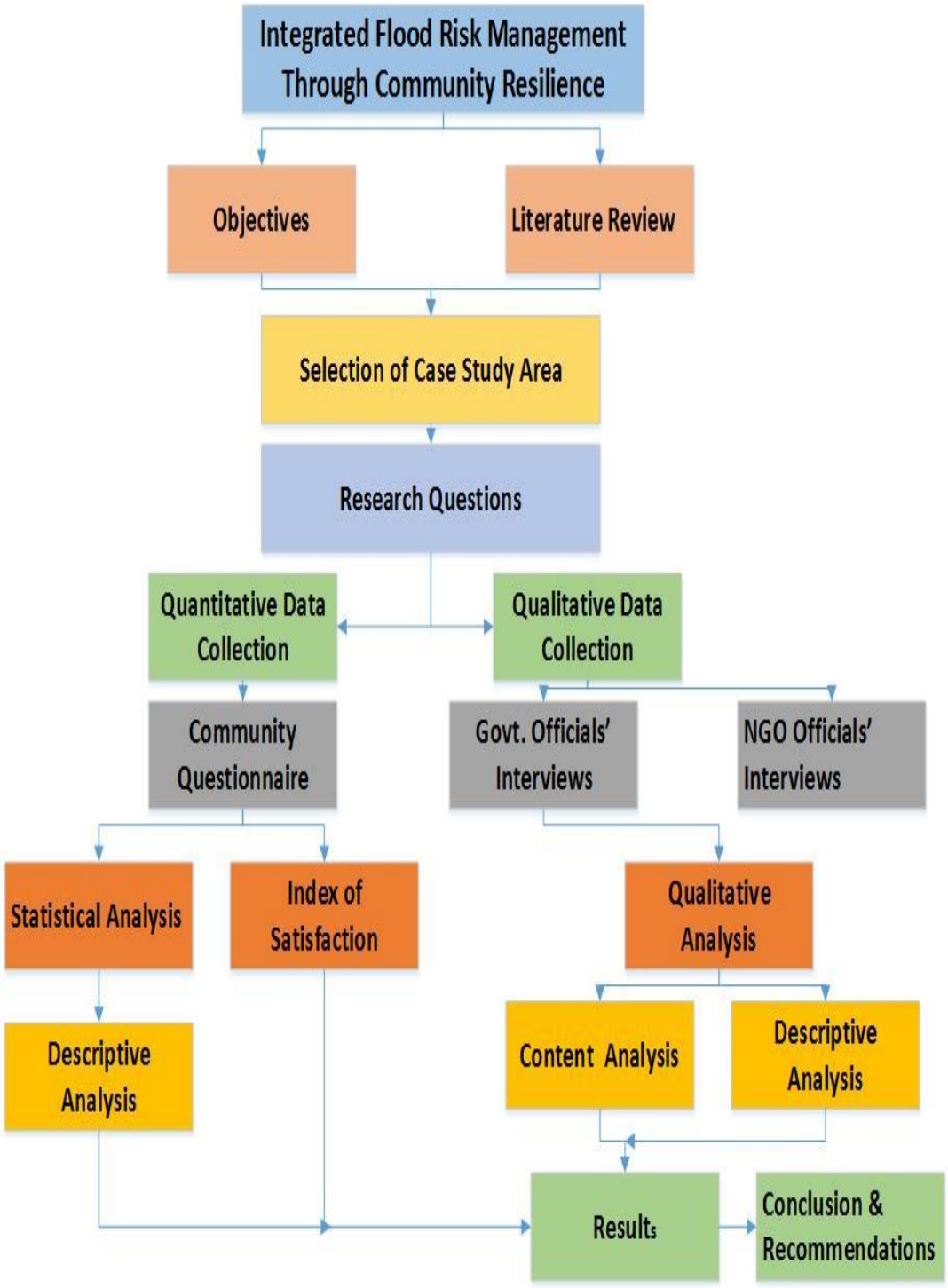

Figure 2: Research methodology flow chart

Chapter4

Results

In order to examine flood risk management and resilience building in District Layyah, 200 questionnaires were filled face to face by the researcher and the surveyors in community from the 4 most devastated Union Councils in 2010 flood event. The IDSP NGO (Local NGO, Layyah) volunteered two surveyors for the fulfilment of questionnaires from four different locations in District. In addition, there were guides available from community who helped in communicating with elder respondents in Saraiki language. Fourteen UCs were fully distorted among the forty-four UCs of district Layyah as claimed by district Government.

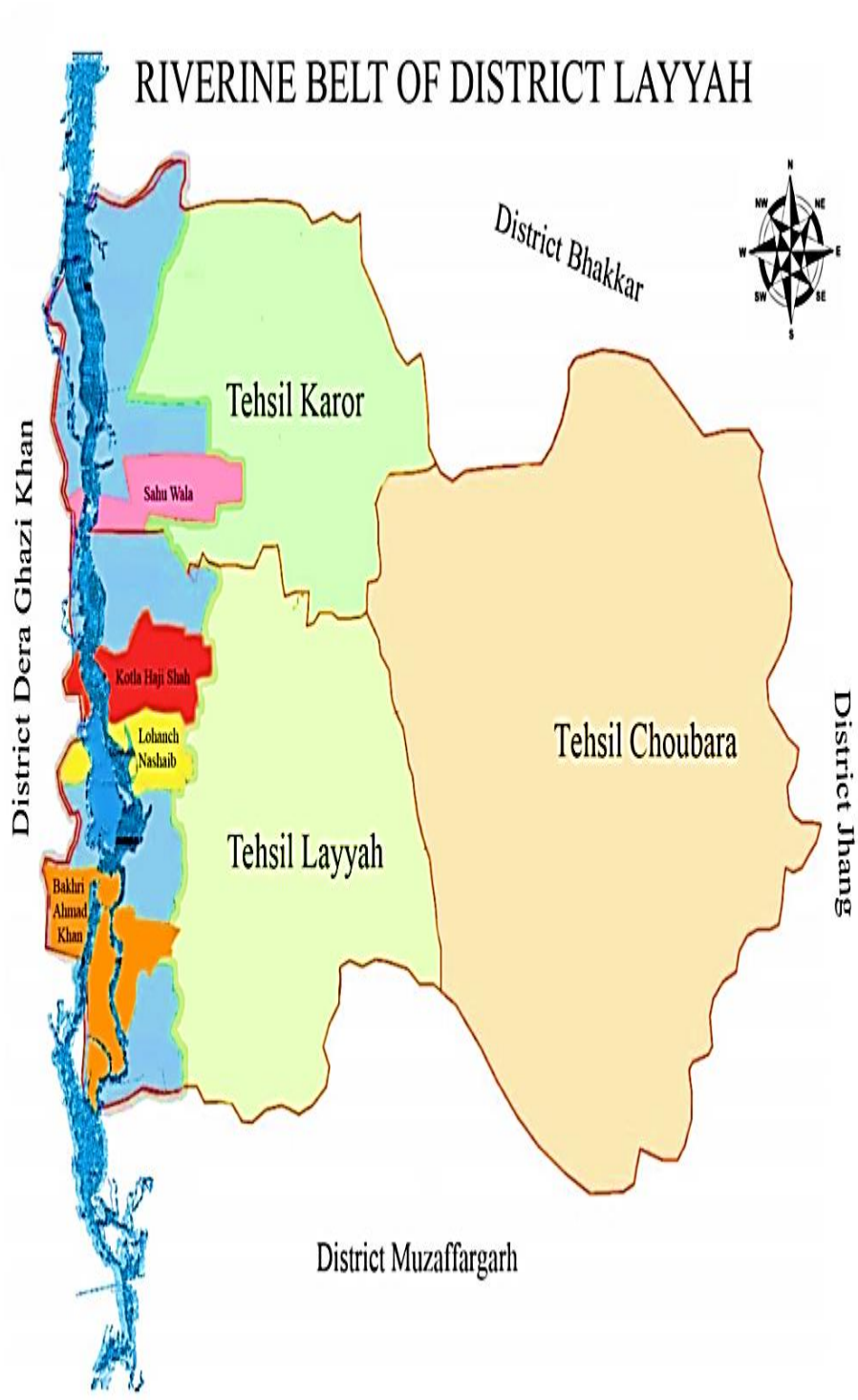

Figure 3: Case study areas within riverine belt of district Layyah

Source: PLAN International

4.1 SOCIOECONOMICS OF COMMUNITY

Table 4-1: Socio-economics of case study area

Socioeconomics	Category	Localities			
		Lohanch Nashaib	**Bakhri Ahmed Khan**	**Kotla Haji Shah**	**Sahu Wala**
		n (%)	**n (%)**	**n (%)**	**n (%)**
Age	*30-35*	*10(20)*	*6(12)*	*13(26)*	*15(30)*
	36-40	*16(32)*	*5(10)*	*9(18)*	*18(36)*
	41-45	*14(28)*	*13(26)*	*8(16)*	*7(14)*
	46-50	*10(20)*	*19(38)*	*12(24)*	*4(8)*
	51-55	0(0)	7(14)	8(16)	6(12)
	Total	**50(100)**	**50(100)**	**50**	**50(100)**
Gender	*Male*	*30(60)*	*30(60)*	*40(80)*	*40(80)*
	Female	*20(40)*	*20(40)*	*10(20)*	*10(20)*
	Total	50(100)	50(100)	50(100)	50(100)
Family System	*Single*	*9(18)*	*15(30)*	*10(20)*	*18(36)*
	Joint	*41(82)*	*35(70)*	*40(80)*	*32(64)*
	Total	**50(100)**	**50(100)**	**50(100)**	**50(100)**
Household Size	*One family*	*9(18)*	*14(28)*	*10(20)*	*18(36)*
	Two families	*0(0)*	*0(0)*	*14(28)*	*6(12)*
	Three families	*7(14)*	*5(10)*	*21(42)*	*22(44)*
	Four families	*23(46)*	*22(44)*	*5(10)*	*4(8)*

	Five families	*11(22)*	*9(18)*	*0(0)*	*0(0)*
	Total	**50(100)**	**50(100)**	**50(100)**	**50(100)**
Bread Earners	*One earners*	*2(4)*	*3(6)*	*6(12)*	*12(24)*
	Two earners	*8(16)*	*11(22)*	*12(24)*	*14(28)*
	Three earners	*18(36)*	*13(26)*	*25(50)*	*23(46)*
	Four earners	*14(28)*	*16(32)*	*7(14)*	*1(2)*
	Five earners	*8(16)*	*7(14)*	*0(0)*	*0(0)*
	Total	***50(100)***	***50(100)***	***50(100)***	***50(100)***
Occupation	*Laborer*	*37(74)*	*1(2)*	*24(48)*	*27(54)*
	self employed	*12(24)*	*21(42)*	*14(28)*	*21(42)*
	Farmer	*1(2)*	*23(46)*	*9(18)*	*0(0)*
	housewife	*0(0)*	*5(10)*	*3(6)*	*2(4)*
	Total	***50(100)***	***50(100)***	***50(100)***	***50(100)***
Education Level	*No formal Education*	*24(48)*	*25(50)*	*12(24)*	*10(20)*
	Primary	*11(22)*	*10(20)*	*4(8)*	*6(12)*
	Middle	*11(22)*	*7(14)*	*11(22)*	*8(92)*
	Matric	*4(8)*	*8(16)*	*12(24)*	*14(28)*
	Bachelors	*0(0)*	*0(0)*	*7(14)*	*9(18)*
	Masters	*0(0)*	*0(0)*	*4(8)*	*3(6)*
	Total	***50(100)***	***50(100)***	***50(100)***	***50(100)***

The above table is quite revealing about the socioeconomic status of the people living in the riverine area of District Layyah that is vulnerable to annual flooding. The socioeconomic data of community gives the insight of gender, age, locality, highest education level, family system, household size and number of bread earners and occupation in the case study area of research. 25 % responses gathered from each of the Union Council of case study area. In Lohanch Nashaib, people have the lowest socio economic status. During field survey, respondents living in tents and at the bank of river were also asked questions related to their flood experience of 2010 and annual floods after 2010, as they are most vulnerable to annual flooding in District.

Both genders filled the community questionnaires. Among 200 questionnaires, 70 % responses were collected from males and 30 % responses gathered from females. In Lohanch Nashaib and Bakhri Ahmed Khan male respondents were 60 % and female respondents were 40%. While in Kotla Haji Shah and Sahu Wala, 80 % male respondents and 20 % female respondents were asked about questions about FRM and resilience building practices in their areas. The Age of respondents had categorized in five groups. 24 % responses gathered from age group of 36-40 years old and 10 percent were taken from age group 51-55 years old. In Lohanch Nashaib, 24 % people from age category of 36-40 years old got interviewed for the fulfilment of questionnaire and in Bakhri Amhed Khan the highest percentage was 38 from age category of 51-55 years old. Similarly, 26 % respondents from Kotla Haji Shah filled the questionnaire that had fallen under age category of 30-35 and the age category 36-40 was dominant in Sahu Wala with highest percentage of people i.e 36 %. Most of the respondents both males and

females were asked questions while working in the fields as the data was collected at the time of sugar-cane crop harvesting in District Layyah. It was observed that people of all age group work there in fields on daily wages.

In Lohanch Nashaib, 82 % respondents lived in joint family system while in Sahu Wala 64 % families lived collectively. Communities have strong connection with each other in all the four localities of the riverine area in District Layyah. The adaptive capacity of community lies in living in sheer vicinity.

In Lohanch Nashaib 46 % and in Bakhri Ahmed Khan 44 % Household had size 4 while maximum household size was 5 and 22 % households in Lohanch Nashaib got it. Moreover, in Kotla Haji Shah 42 and Sahu Wala 44 percent households had size 3, which found maximum there. I t had observed in field survey that people live close to each other. Each household in family shares courtyard and baths. Although they have separate kitchens but they help share happiness and sorrows with one another, which makes them socially resilient to any, stress or pressure and hazard. The above table shows the number of bread earners per household. In Lohanch Nashaib, 36 % household had 3 bread earners and 32 % households in Bakhri Ahmed Khan had 4 bread earners. In Lohanch Nashaib, 16 % household had 5 bread earners which was found maximum in whole sample. The socioeconomic status of people living in Lohanch Nashaib was found comparatively low. During field survey in one of the village named as Manchary Mohana, an old man told about his problems. He reported 2010 flood as major disaster as he had lost his home. One local NGO helped him to rebuild his house but the help was limited. He said “I live in tent with my wife as after 2010 flood NGO helped to build only one room, bathroom and Kitchen. Now my son has got

married and I live in tent and bearing the severity of weather". Both males and females work in those flood-affected areas to fulfil their basic needs. In field survey, it was observed that females are the major contributors towards family income in riverine areas. Their contribution towards survival and living of families is very often equal if not much more than males in marginal income households. Moreover, due to gender biasness, officials and economists do not highlight their contribution towards local and national economy although it would come in notable volume. When asked from one female respondent in U.C Lohanch Nashaib about her earning source, she said, "All women from our locality work from morning to evening in fields. We get up early in morning and after leaving our children for school, we go to work. As it is sugarcane season, so nowadays we go for cutting of this crop".

They people do work in fields. Seasonal crop harvesting is the major occupation of people live in areas close to river as the riverine belt is included in rural areas of District Layyah. 42 % population was found self-employed in Bakhri Ahmed Khan and Sahu Wala. Men work as shopkeeper, barber, and cobbler while self-employed women work in their homes. It was observed during field survey that women have greater responsibilities as they have to look after their family and livestock. They make handicrafts and then sell them in local market at very low rates. In Lohanch Nashaib 74 % population work as labourers but in Bakhri Ahmed Khan 46 % farmers were reported. While in Kotla Haji Shah, 42 % and in Sahu Wala 54 % population work as labourer.

In field survey, the Education level in 4 U.Cs was found varyingly. Results show that the 38% of the respondents are illiterate. While, the people with

matriculation are 18% and the least percentage respondents possess with Bachelor's degree. During survey in Lohanch Nashaib, Sahu Wala and Kotla Haji Shah, respondents demand and highlighted lack the education facilities in their U.Cs for their daughters especially as there was only Middle School in each U.C for girls although High School in each U.C for boys only. One of the female respondents from Basti Manchary Mohana in UC Lohanch Nashaib asked for permanent place in Layyah City so their children's education would not be affected by annual flooding. As she mentioned, schools remain close when flood hit the area and school buildings get deteriorate each year. Many respondents in UC Sahu Wala and Kotla Haji Shah criticize the unjust educational facilities, as they want higher education in their UCs. When asked for a reason behind criticism the one of the bachelor's student of female respondent in Kotla Haji Shah briefed that female students have to move daily to city for higher secondary education and boys for college or university. In Lohanch Nashaib, the flood affected people live hand to mouth and child labour was observed in all the localities but in Lohanch Nashaib more children were seen as labourer.

4.2 DAMAGES DUE TO FLOODING

4.2.1 Damage to Houses

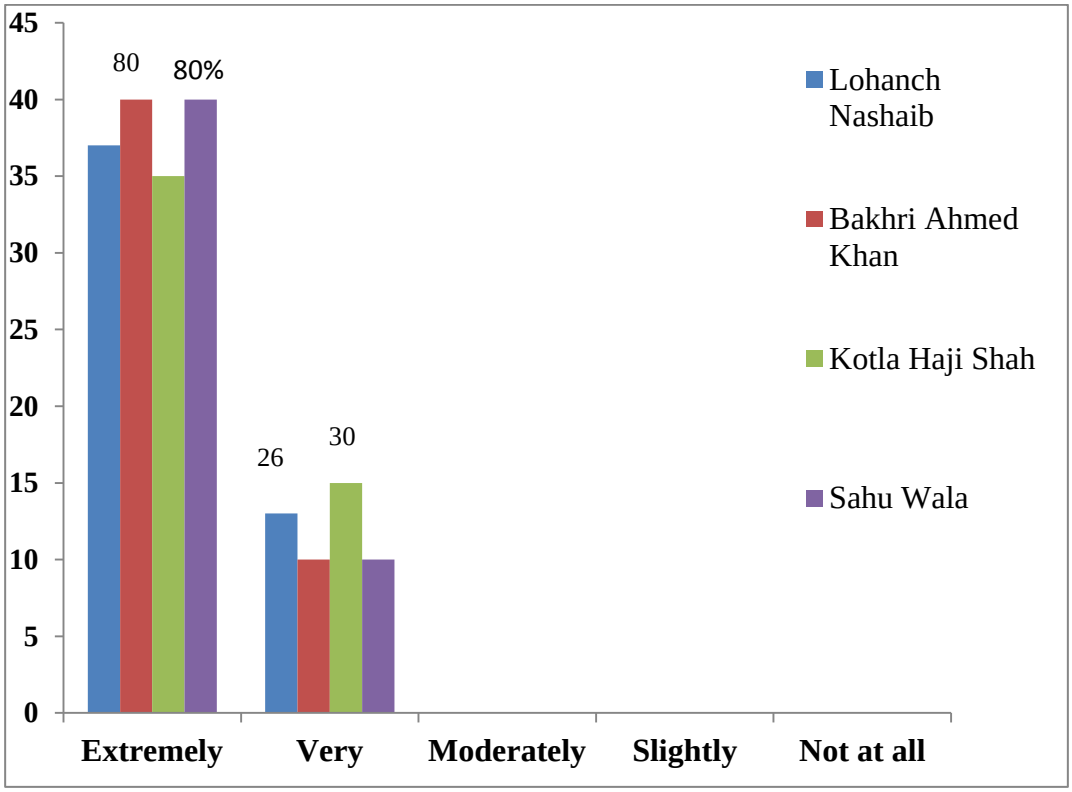

Figure 4: Extent of damage due to 2010 floods in case study areas

In 2010 and afterwards annual floods cause damages to the riverine belt of district Layyah. The above figure shows among four localities, 80 percent population of Bakhri Ahmed Khan and Sahu Wala got extreme wreckage to their houses. Their houses were fully demolished and they were shifted to emergency relief camps. 30 % population of the Kotla Haji Shah reported that their houses were much damaged. One of the female respondents from Kotla Haji Shah said that few of their rooms were fully grounded although others not as they were pakka (brick& mortar).

4.2.2 Cost of Damaged Houses

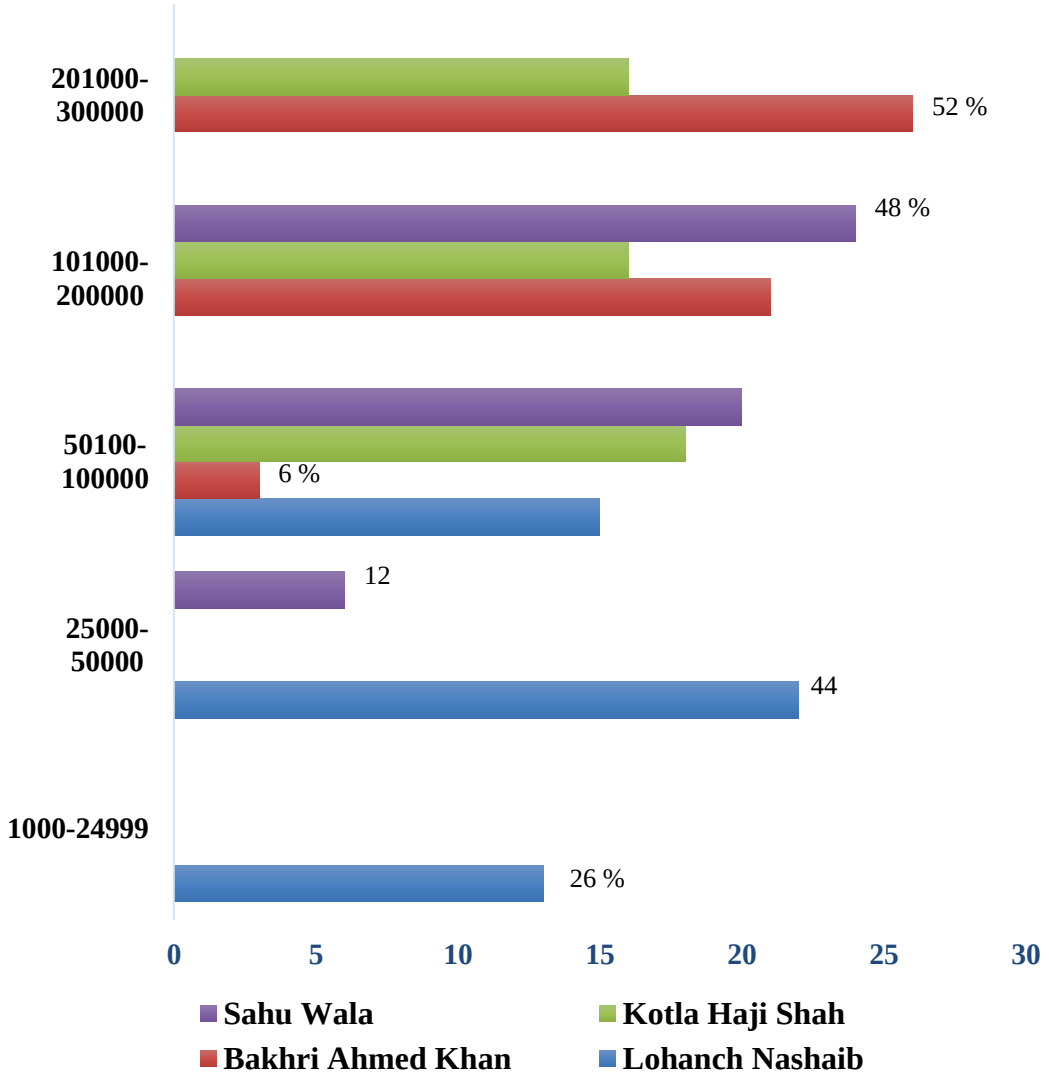

Figure 5: Cost of damage due to 2010 floods in case study areas

It was also observed in field survey that Bakhri Ahmed Khan and Lohanch Nashaib suffered greater destruction from the super flood and also from the 2011, 2014 and 2015 annual floods. The cost of damage varies in four localities. In Bakhri Ahmed Khan, 52 % population reported 201000-300000 rupees as the range of their house damage cost and 6 % said that 50100-100000 rupees were the cost of their affected houses in 2010 flood event.

4.2.3 Damage to Crops

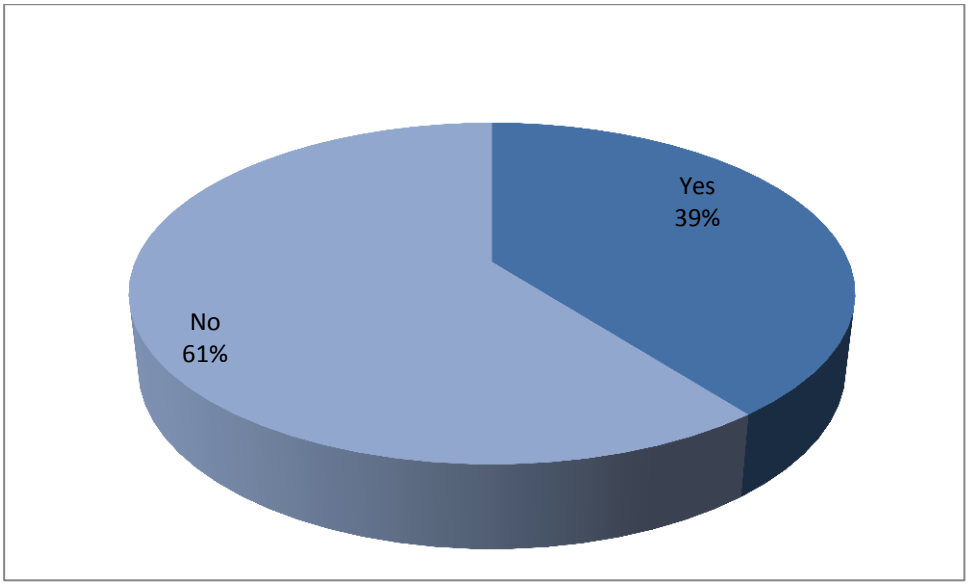

Figure 6: Crop Ownership

Above figure shows that 39 % population owned crops in case study area while the landless percentage includes the most indigenous group of labourers and self-employed people. And when asked about the extent of damage to their crops, 39 % population reported extremely damage to crops.

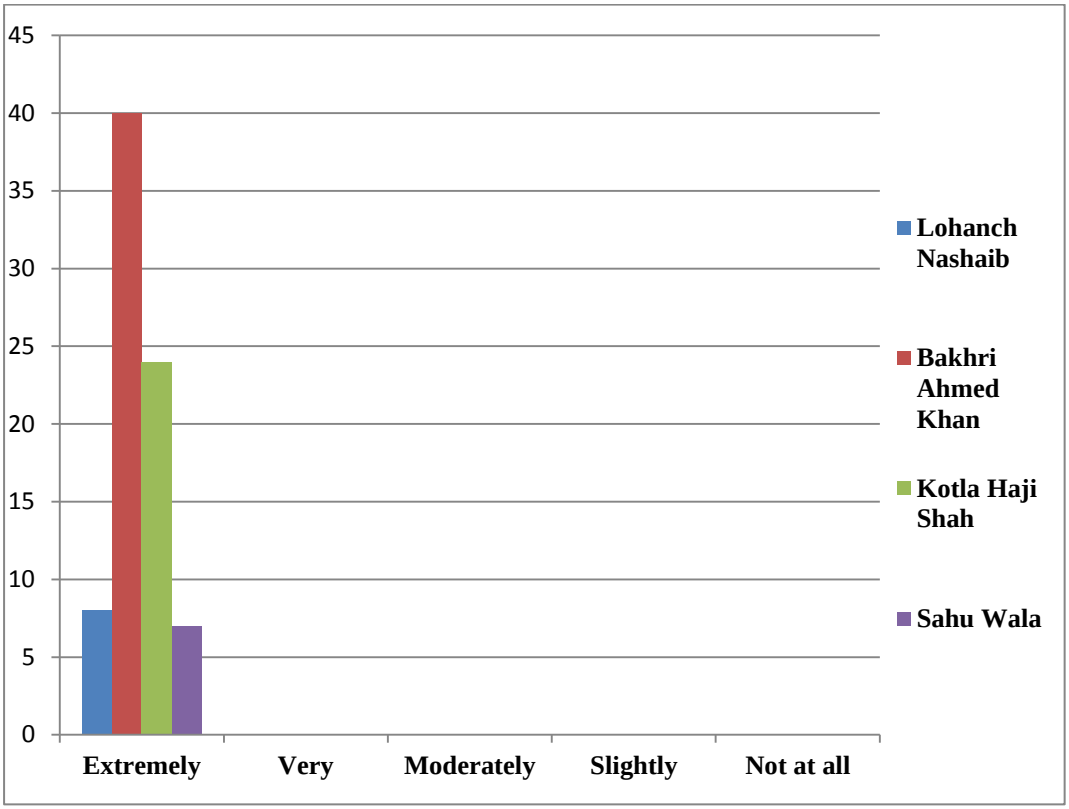

Figure 7: Extent of damage to crops in case study areas

Among the four localities, 80 % population had loss to crops in Bakhri Ahmed Khan as the crop ownership was higher than other three UCs. In Sahu Wala, only 14 % population reported crops damage. Similarly, the range of cost for the damaged crops in all localities varies with respect to area of land they owned for crops as shownin graph below. In LohanchNashaib, 75 % people reported 50,000 to 1 lac Rupees as cost of their crops while in Bakhri Ahmed Khan maximum range was 3 to 4 lac rupees as 43 % population narrated. And in UC Kotla Haji Shah and Sahu Wala 34 % and 43 % population reported 2 to 3 lac Rupees damage for their crops. As shown in table 4.1, maximum number of farmers is living in Bakhri Ahmed Khan while in Sahu Wala and Kotla Haji Shah, majority of population work as tenants on crop fields owned by landlords who live

in Layyah city or other big cities. These tenants manage their crops and get their livelihood by working day and night.

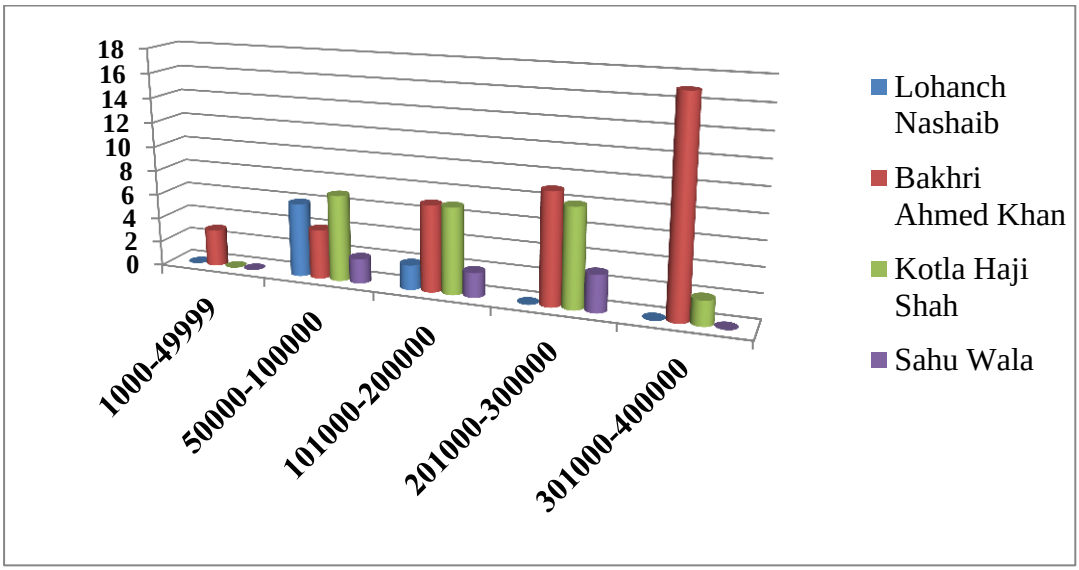

Figure 8: Cost of damage to crops due to 2010 floods in case study areas

4.2.4 Livelihood Damage

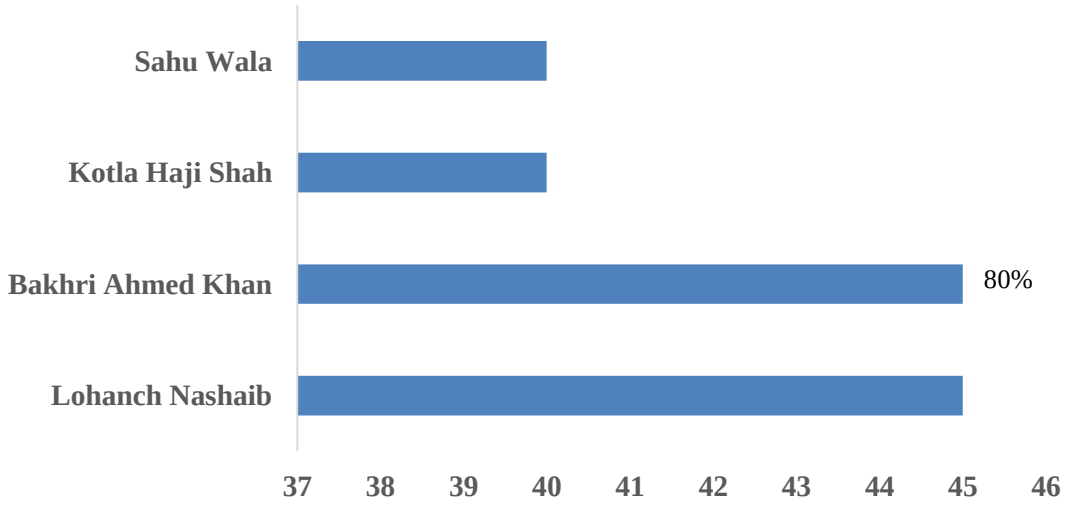

Figure 9: Livelihood damage due to 2010 floods in case study areas

The figure above elaborates that 85 % population of riverine area had lost their livelihood when the flood hit in 2010. Flood affects the livelihood source of all the people related to agriculture, services, trade and craft. The cost of livelihood damage found varying in four localities. In Lohanch Nashaib, 62% population, reported 20000 to 25000 rupees damage cost of livelihood, as the frequency of labourers is greater in this UC. The daily wage of labourer was reported 300 to 400 rupees per day. In Bakhri Ahmed Khan and Kotla Haji Shah, maximum range of monetary loss was 50000 to 1 lac rupees. While in Sahu Wala, 50 % population had 1 lac to 1, 50,000 rupees damage and other 50 % reported 50000 to 100000 rupees for livelihood damage estimate due to flooding in month of August 2010.

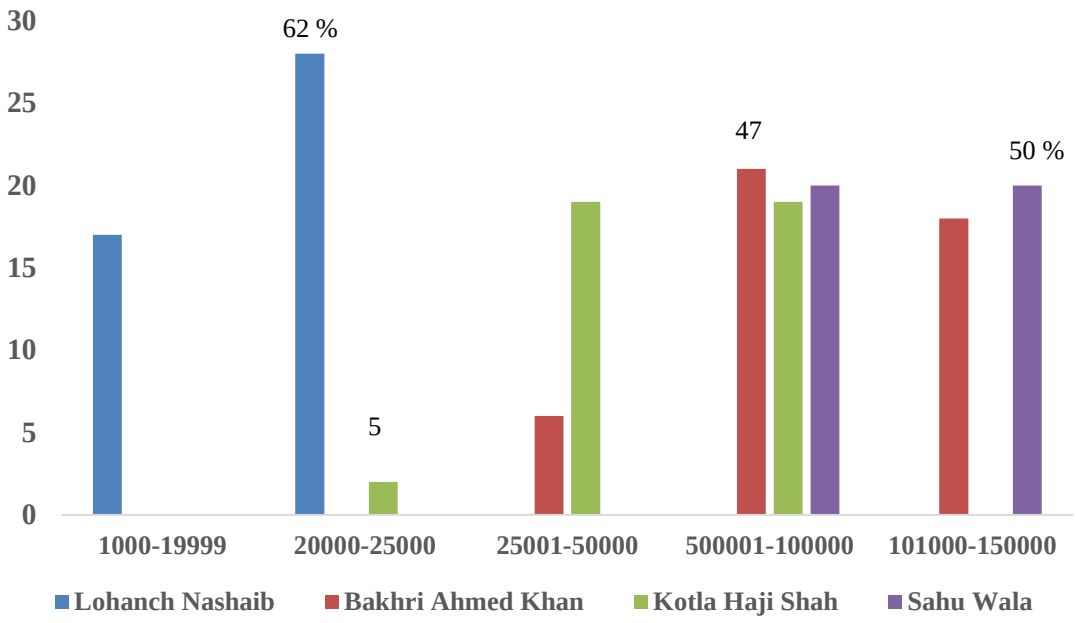

Figure 10: Cost of Livelihood damage due to 2010 floods in case study areas

4.2.5 Damage to Roads

The table below shows the extent of damage to the roads in case study area due to 2010 flooding. 80 % population reported moderately damage to roads. During field visit, it was observed that the roads are still damaged and need maintenance. While travelling to one village (ChahKhoay Wala) of Bakhri Ahmed Khan the road was totally damaged and this village is situated at 15 min drive from the market of UC. Hence, the 54 % population reported that roads were very deteriorated due to flood and get damaged by annual floods in riverine area after 2010. When asked about the duration of unavailability period, 66 % population reported 5 to 6 weeks duration in which roads were not available for mobility. In riverine area of district Layyah, public transport is available from city to tehsil's major locality/UC. People use carts driven by camels, donkeys and cows, rickshaw, bicycle, bike, tractor and trolleys for transport and carriage. Most of the villages do not have constructed roads but they use the path made through the soil. Even one UC Baseera in riverine belt does not have access by road and people use boats to get there.

Table 4-2: Extent of damage to roads and their availability period after 2010 floods

Extent of Damage	Frequency n (%)	Localities			
		Lohanch Nashaib n (%)	Bakhri Ahmed Khan n (%)	Kotla Haji Shah n (%)	Sahu Wala n (%)
Extremely	0(0)	0	0	0	0
Very	41(20)	12(24)	27(54)	2(4)	0
Moderately	159(80)	38(76)	23(46)	48(96)	50(100)
Slightly	0	0	0	0	0
Not at all	0	0	0	0	0
Total	**200(100)**	**50(100)**	**50(100)**	**50(100)**	**50(100)**
Unavailability period of roads					
3-4 weeks	69(34)	12(24)	8(16)	22(44)	27(54)
5-6 weeks	131(66)	38(76)	42(84)	28(56)	23(46)
Total	**200(100)**	**50(100)**	**50(100)**	**50(100)**	**50(100)**

4.2.6 Damage to Hospitals

Table below shows the extent of damage to basic health units in chosen localities of riverine area. Overall, 54 % population reported that the damage was very severe to BHU buildings. In Bakhri Ahmed Khan, 86% people said that floodwater entered the building caused roofs and walls to collapse. While in Sahu Wala, 78 % people reported moderately damage to BHU in their locality. The walls and roof slabs of hospitals got cracks. The hospitals were not properly managed and repaired uptil one to one and half month. Although government had setup medical camps in disaster hit areas which gave first aid and free medical check-up to the flood victims.

Table 4-3: Extent of damage to hospitals and unavailability period after 2010 floods in case study areas

Extent of Damage	Frequency n (%)	Localities			
		LohanchNashaib n (%)	Bakhri Ahmed Khan n (%)	Kotla Haji Shah n (%)	Sahu Wala n (%)
Extremely	0	0	0	0	0
Very	108(54)	41(82)	43(86)	13(26)	11(22)
Moderately	92(46)	9(18)	7(14)	37(74)	39(78)
Slightly	0	0	0	0	0
Not at all	0	0	0	0	0
Total	**200(100)**	**50(100)**	**50(100)**	**50(100)**	**50(100)**
Unavailability period of BHUs					
1 Month	91(45)	25(50)	25(50)	17(34)	24(48)
1.5 Month	109(55)	25(50)	25(50)	33(66)	26(52)
Total	**200(100)**	**50(100)**	**50(100)**	**50(100)**	**50(100)**

4.2.7 Damage to Schools

The table below shows that 40 percent of population in case study area reported that there was extreme damage to school buildings and totally grounded while 24 % said that the schools were very damaged as walls and roofs of many rooms were deteriorated. And 36 % population reported moderate damage to schools in Sahu Wala and Kotla Haji Shah. This damage resulted in gap of in education of local children of 1-2 months.

Table 4-4: Extent of damage to schools and unavailability period after 2010 floods in case study areas

Extent of Damage	Frequency n (%)	Localities			
		LohanchNashaibn (%)	Bakhri Ahmed Khan n (%)	Kotla Haji Shah n (%)	Sahu Wala n (%)
Extremely	80(40)	39(78)	41(82)	0	0
Very	49(24)	11(22)	9(18)	25(50)	4(8)
Moderately	71(36)	0	0	25(50)	46(92)
Slightly	0	0	0	0	0
Not at all	0	0	0	0	0
Total	**200(100)**	**50(100)**	**50(100)**	**50(100)**	**50(100)**
Closed duration of Schools					
1.5 Month	56(28)	16(32)	10(20)	15(30)	15(30)
2 Months	144(72)	34(68)	40(80)	35(70)	35(70)
Total	**200**	**50(100)**	**50(100)**	**50(100)**	**50(100)**

4.2.8 Power Supply cut off duration

Flood damages also inflicted rupture to the power supply in the region resulting in total cut off power supply for 1-1.5 months.

Table 4-5: Power supply cut off duration after 2010 floods in district Layyah

Closed Duration	Localities			
	LohanchNashaib n (%)	Bakhri Ahmed Khan n (%)	Kotla Haji Shah n (%)	Sahu Wala n (%)
1.5 Month	13(26)	18(36)	20(40)	33(66)
1 Months	37(74)	32(64)	30(60)	17(34)
Total	**50(100)**	**50(100)**	**50(100)**	**50(100)**

4.2.9 Injury

Table 4-1: Types of injuries found in case study areas due to 2010 floods

Type of Injury	Localities			
	Lohanch Nashaib (n)	Bakhri Ahmed Khan (n)	Kotla Haji Shah (n)	Sahu Wala (n)
Handicap	0	1	0	0
Major Injury (to internal organs)	1	0	0	0
No Injury	49	49	50	50
Total	50	50	50	50

Two injuries were reported out of 200 samples. In Bakhri Ahmad khan, a female under age group of 45-50 years got handicapped, as she had broken her arm. A

school-going child of age 10 years from LohanchNashaib suffered from various major internal injuries after the wall of his school collapsed on him.

4.2.10 Diseases

Most incidents of eye ailments were recorded in affected people followed by malaria. Flood caused wide spread epidemic breakout after floods included skin diseases and diarrhoea.

Table 4-7: Types of diseases outspread due to 2010 floods in case study areas

Diseases	Frequency n (%)	Localities			
		Lohanch Nashaib n (%)	Bakhri Ahmed Khan n (%)	Kotla Haji Shah n (%)	Sahu Wala n (%)
Malaria	101	30	24	21	26
Eye Ailments	145	32	34	41	38
Skin diseases	125	28	39	25	33
Diarrhea	49	19	14	8	8

4.3 FLOOD RISK MANAGEMENT IN CASE STUDY AREA

Table 4-8: Flood risk management in case study areas

FRM Practices	Frequency n (%)	Localities			
		Lohanch Nashaib (n)	Bakhri Ahmed Khan (n)	Kotla Haji Shah (n)	Sahu Wala (n)
Emergency Shelter	172(86)	34	45	47	46
Soft Loan	20(10)	0	10	10	0
Financial Aid	40(20)	4	17	9	10
Food	100(50)	28	5	29	22

The above table depicts the flood risk management in case study area. When flood hit the riverine area in 2010, emergency shelter and rescue was the first priority of government and NGOs. When asked about relief camps, it was found that Government declared few schools, colleges and district Layyah jail as camps for flood-affected community. After 2010 flood, government annually do this practice of shifting people in different schools of Layyah city. In Kotla Haji Shah 23% people got emergency shelter although 17% people living in Lohanch Nashaib received emergency shelter. In relief camps, 50 percent population got the food by the local, national and international organizations. The major source for provision of food was organizations as 42% respondents claimed they received cooked and non-cooked food items from the different organizations and 8 % said

they received food from relatives in city although government played no role in providing food to flood affected community in relief camps. 15% people claimed of receiving food in Kotla Haji Shah but only 2 % respondents in Bakhri Ahmed Khan got food. When the level of flood water became low, people went back to their homes and started living there in deteriorated house and tents provided by the organizations. Government had started a scheme in order to provide financial assistance to flood affected community. Wattan Cards were distributed by the government and 9% respondents got these cards in Bakhri Ahmed Khan as this UC's local representatives have strong support from government. In Lohanch Nashaib only 2 % people got wattan cards. These cards were issued to married man/woman with the help of which they got 20 thousand rupees. In Lohanch Nashaib, respondents were not satisfied by this financial help of government. They tried a lot to get but cards were given only to few deserving people and many to those who had government and political references on their backs. Only 10% respondents got soft loan in UC Bakhri Ahmed Khan and Kotla Haji Shah from their relatives. One of the male respondents in UC Kotla Haji Shah said he got soft loan of five thousand rupees from my cousin in order to get food and other non-food items for my family. On other hand, one old respondent in Lohanch Nashaib said "I do not like to take anything from anybody; flood hit not only our homes but also our self-respect. I felt ashamed of getting any help from relatives".

4.4 RECOVERY FROM DISASTER

4.4.1 Rehabilitation

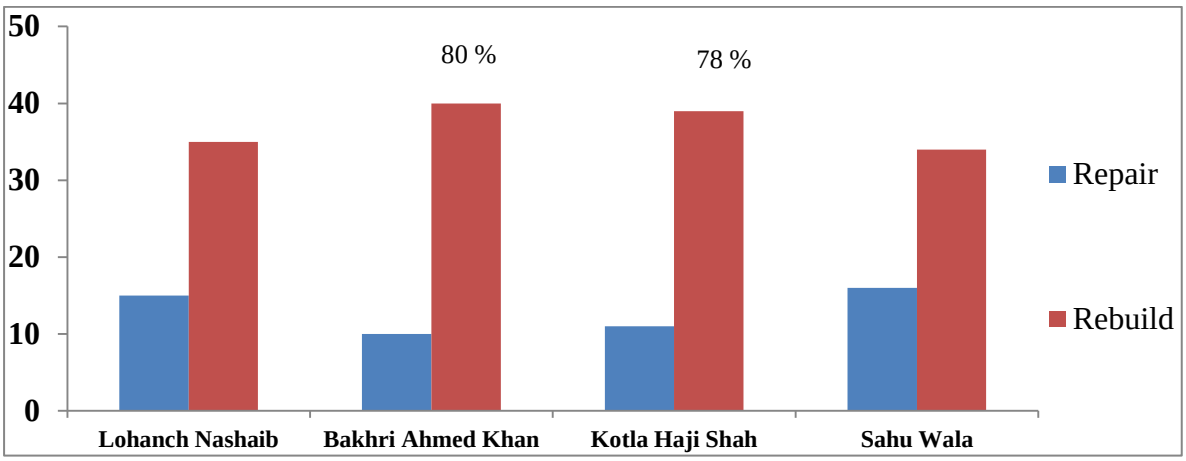

Figure 11: Rehabilitation after 2010 floods in district Layyah

Table below shows the pattern and sources of recovery from disaster in flood-hit localities in case study area. As 2010 flood caused havoc in riverine area, houses were destroyed and 80% respondents in Bakhri Ahmed Khan built their houses. Moreover, 32% population repaired houses after 2010 flood and the maximum number of respondents were found in Sahu Wala. In case study area, katcha and pakka houses were seen. People use mud, bamboo, sheets made of bamboo sticks, wood and bricks as building material for construction of their houses. In addition, when asked about source who helped them then 48 % respondents reported that Non-government and International organizations helped them as shown in table 4-12. In Lohanch Nashaib 70 % reported, that NGOs rebuilt their houses and only 20 % in Sahu Wala got help from Government to rebuild their houses. 64 % population in Kotla Haji Shah told that they helped themselves to repair and rebuild their houses by taking soft loans from relatives or by selling their livestock. It can be concluded, government and organizations for flood

response and recovery did not satisfy the community in Kotla Haji Shah and Sahu Wala.

Table 4-9: Rehabilitation sources after 2010 floods in case study areas

Sources	Lohanch Nashaib n (%)	Bakhri Ahmed Khan n (%)	Kotla Haji Shah n (%)	Sahu Wala n (%)
Government	0(0)	0(0)	0(0)	10(20)
Organizations	35(70)	24(48)	18(36)	20(40)
By Self help	15(30)	26(52)	32(64)	20(40)
Total	**50(100)**	**50(100)**	**50(100)**	**50(100)**

4.4.2 Local Indigenous Practices

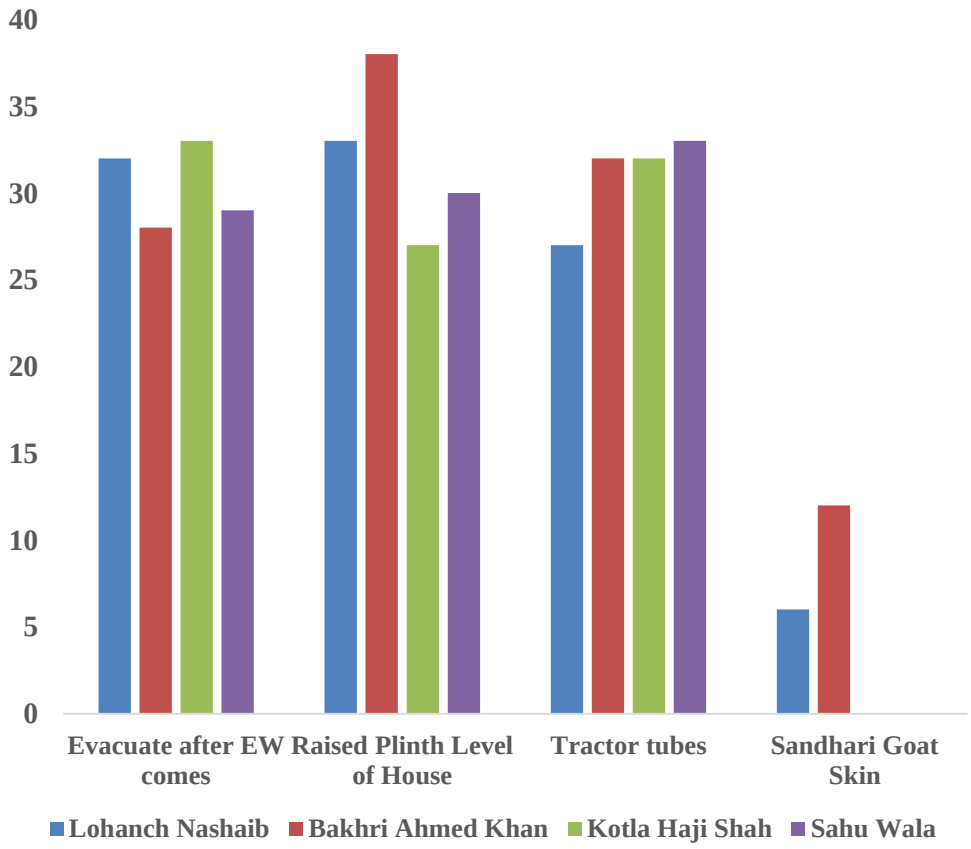

Figure 12: Local indigenous practices for flood risk management in case study areas

The figure above shows the local indigenous practices taken and the knowledge gained from the 2010 flood event in District Layyah. 37 respondents of Bakhri Ahmed Khan reported that they started a practice of 4 to 5 feet raised platform of their houses after the 2010 flood event happened. They raised platform of their houses with soil by themselves in their villages. This practice was seen in four localities during field survey. 5 respondents reported that they use Sandhari for crossing flood water and to reach rescue point in case of emergency in Lohanch Nashaib. Sandhari is a sort of outfit made with goat skin and usually the cobblers of the locality made and sell it. When asked about the knowledge gained after 2010 flood, 34 people said they learn to evacuate their localities as soon as possible after early warning received. One of the male respondents in Lohanch Nahaib said "we did not consider the 2010 flood warning and when flood hit our area it was a havoc that destroyed us."

4.4.3 Livelihood Regain

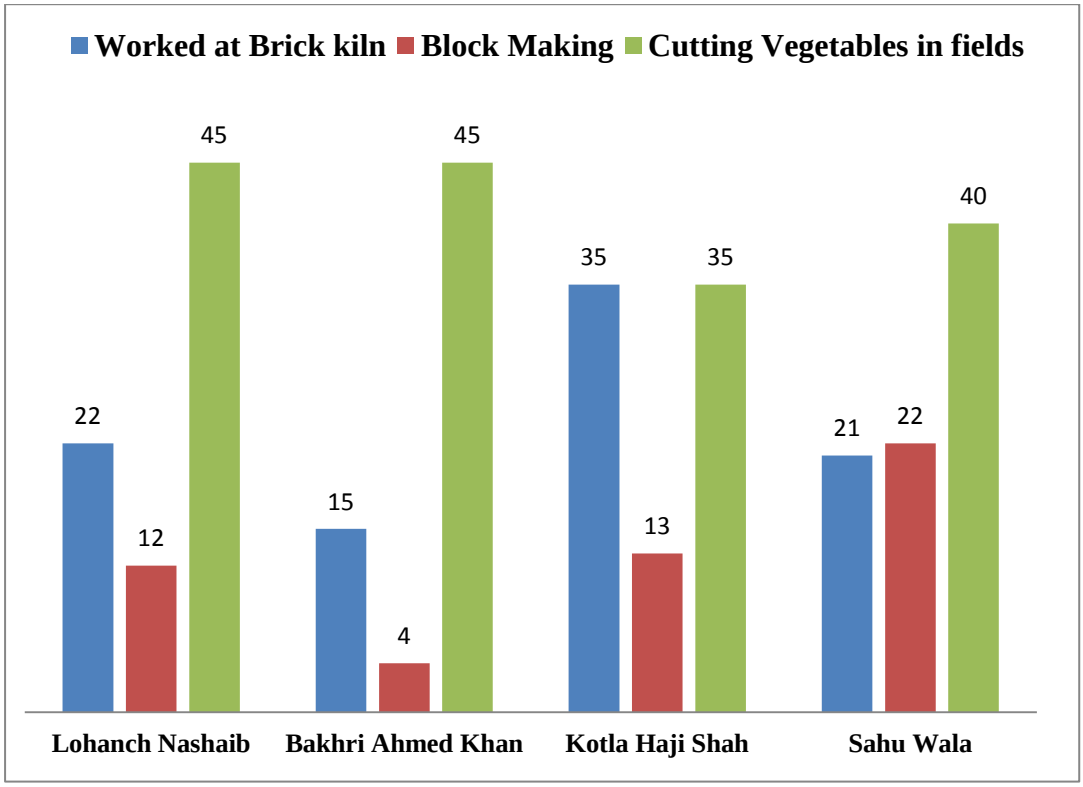

Figure 13: Livelihood regaining sources of affected people after 2010 floods

The results show that 90 % population of Lohanch Nashaib and Bakhri Ahmed Khan area regained their livelihood by cutting vegetables in fields on daily wage of 300 to 400 rupees. Similarly, after the flood males started working in brick kilns and in block making local industries on daily wage while their stay in relief camps so that they could get enough saving to feed their children after leaving flood relief camps in Layyah City.

4.4.4 Infrastructure Resilience

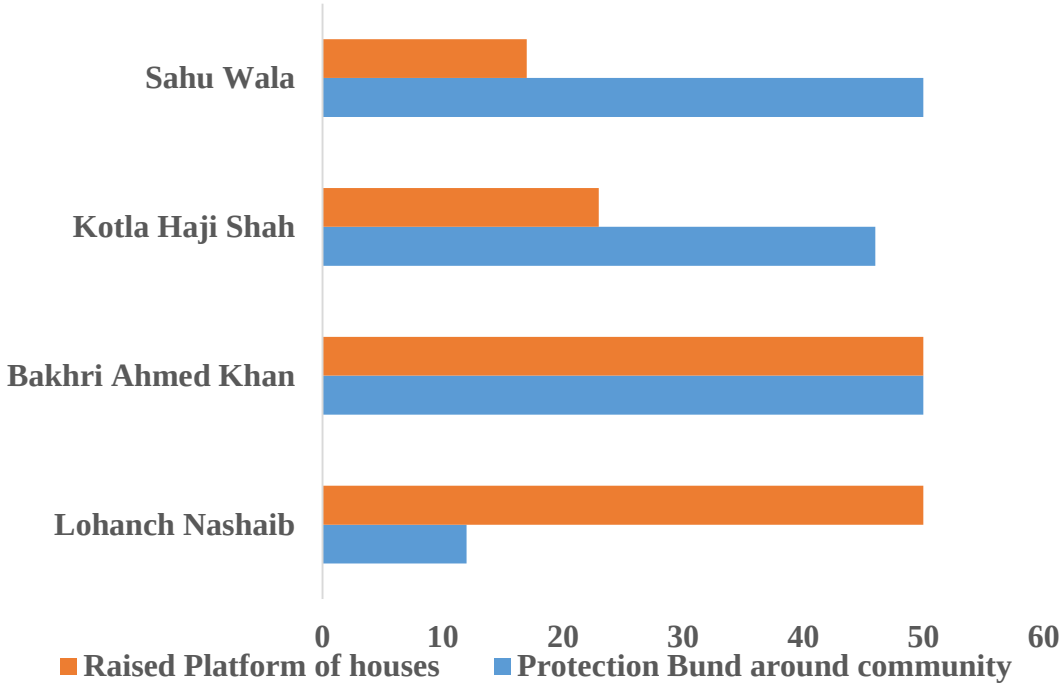

Figure 14: Infrastructure resilience practices in flood affected communities

The figure above shows the infrastructure protection practices in case study area. Two practices have been found that are protection bund around houses and raised platform of houses. In Sahu Wala 75 % population reported that they have, protection bund/embankment around their community although in Lohanch Nashaib 81 % respondents reported that they have raised platforms of their houses. This practice is not sustainable but contributes towards infrastructure resilience in localities of riverine area.

4.5 SATISFACTION LEVEL OF COMMUNITIES TOWARDS GOVERNMENT AND ORGANIZATION ROLE IN FRM

4.5.1 Comparison of Satisfaction Level against Emergency Relief in 2010 flood between Government and NGOs

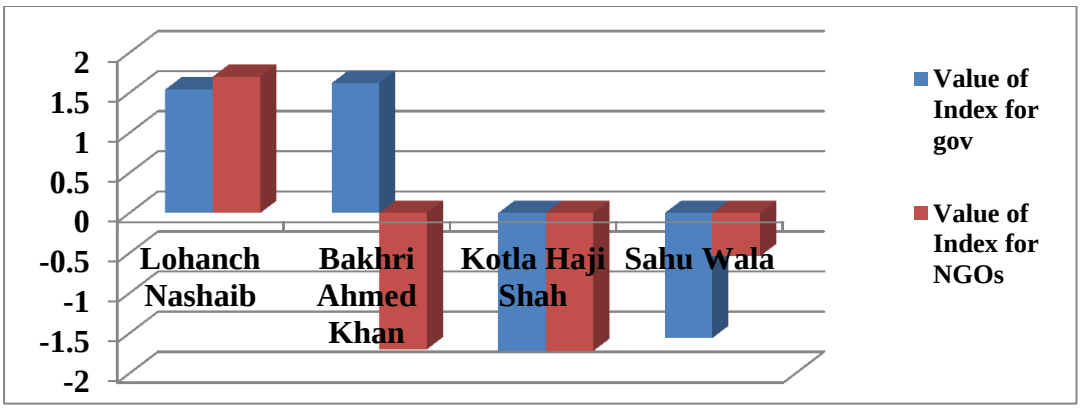

Figure 15: Comparison of satisfaction level against emergency relief during 2010 floods in case study areas between government and NGOs

Figure above represents the findings of comparison of satisfaction level between government and NGOs against emergency relief received by the affected community of 2010 flood in four localities of district Layyah using Yeh's Index of Satisfaction. The results show that respondents had very low satisfaction level in Sahu Wala (-1.56) and Kotla Haji Shah (-1.76) for government. This indicates that these two areas did not get any emergency relief by government. In Sahu Wala and Kotla Haji Shah, flood victims remained neglected due to political biasness. Although in Lohanch Nashaib and Bakhri Ahmed Khan, the values of index are 1.54 and 1.62, which show that satisfaction level was very high. In these two localities, the community that experienced 2010 flood reported vast destruction.

Lohanch Nashaib is the most nearest union council from city Layyah. While in Bakhri Ahmed Khan, political persons had strong connection with DDMA Layyah.

On the other side, the satisfaction level for NGOs in Bakhri Ahmed Khan, Kotla Haji Shah and Sahu Wala was very low as the value of index is below 0.2 in these three localities which indicates that organizations did not play any part in relief works such as evacuation, rescue and first aid. While in Lohanch Nashaib, the affected community responded positively against NGOs role in emergency relief activities during and after 2010 flood event.

4.5.2 Comparison of Satisfaction Level against Response after 2010 flood between Government and NGOs

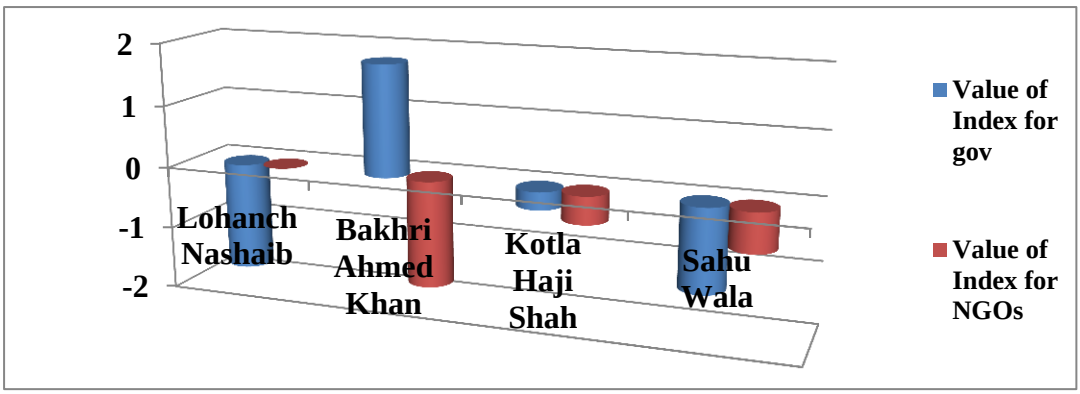

Figure 16: Comparison of response after 2010 floods in case study areas between government and NGOs

The figure above shows the results comparison of satisfaction level between government and NGOs against long-term assistance received by the affected community of 2010 flood in four localities of district Layyah. The findings show that values of index are negative in Lohanch Nashaib (-1.72), Kotla Haji Shah (-0.28) and Sahu Wala (-1.32) which depict very low satisfaction level of respondents for government. The satisfaction level for government was very high

as the value of index is positive (1.78) in Bakhri Ahmed Khan. During field survey, community had shown favourable behaviour for government long-term assistance in Bakhri Ahmed Khan, which included issuance of watan card, installation of hand pumps and flood protection bundd around U.C.

Contrary to this, the satisfaction level for NGOs in three localities was found very low as the index values are negative. For Lohanch Nashaib, the value of index is 0.0, which is acceptable according to YIS. People criticized the NGOs support after 2010 flood event. Many respondents told that organizations helped them and rebuilt their houses. After reconstructing their houses, there was not any monitoring and evaluation system as the houses get cracks and in critical conditions presently.

4.6 ANALYSIS OF INTERVIEWS WITH GOVERNMENT OFFICIALS IN DISTRICT LAYYAH

The second objective of study is to examine the role of local government in FRM and resilience building in the aftermath of 2010 flood event. Therefore, 14 in-depth structured interviews were conducted with representatives of different departments, which come under DDMA Layyah. Most of interviewees were head of departments while 4 interviews were conducted with other representatives on behalf of their department's head.

4.6.1 Experience of Interviewees

The interviewees having 11-15 years of experience in local government were 50 % (7) while only 7 % (1) have less than five years of experience.

Moreover, 16 years and above experienced interviewees were 14% (2) and 29% (4) had 6-10 years of experience.

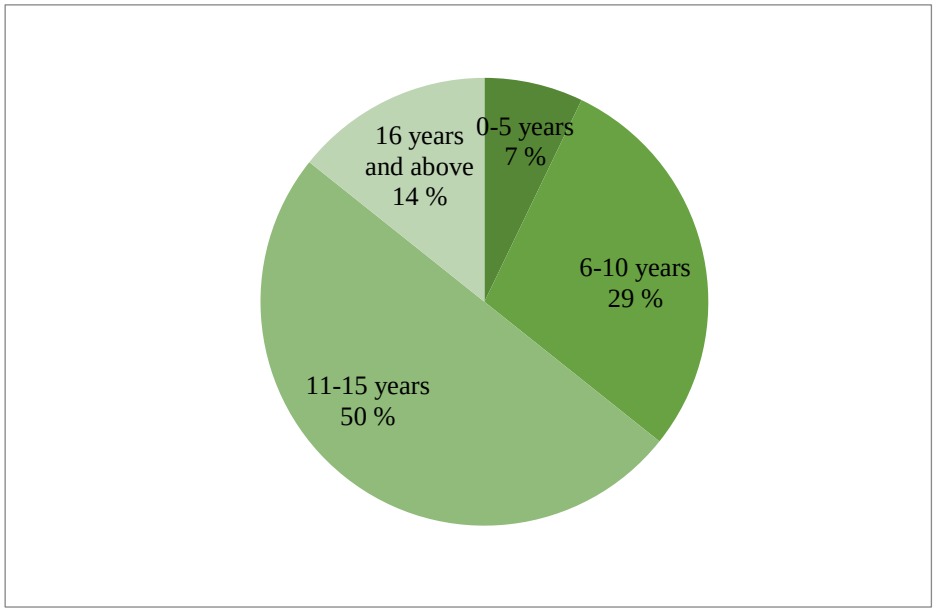

Figure 17: Experience of government interviewees

4.6.2 Qualification of Interviewees

The Education level of interviewees was shown in fig. below. The highest level was 18 years of education and 22 % interviewees had it while 12 years of education was minimum level possessed by 7 % of interviewees. Moreover, 57 % officials had 16 years and 14 % had 14 years of education level in District Layyah.

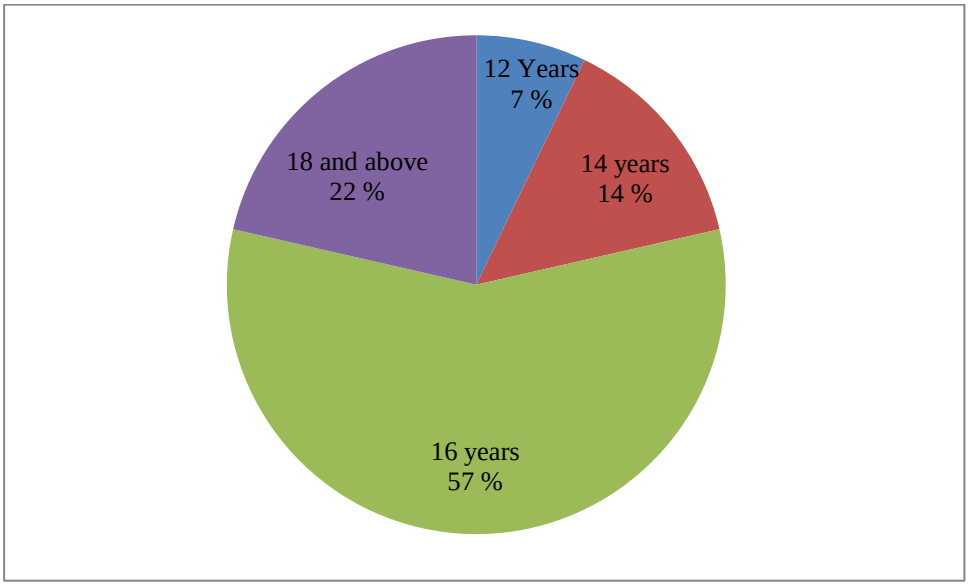

Figure 18: Qualification of government interviewees

4.6.3 DDMA Layyah and Role of Departments

It is calculated that 85% of government officials reported that line departments played role in relief and rescue of the 2010 flood affectees. During interview with District Emergency Officer, Rescue 1122 Layyah, he stated that DDMA is a committee consisted of twenty-one members from different line departments, two members of organizations; one member of national NGO and other member of local organization. DDMA does reporting to PDMA and estimate total demand of funds to fulfill the flood risk reduction measures and preparedness. In 2010, 1122 had done service in emergency relief and rescue. They had ambulances and rescue vehicles. When 2010 flood hit District Layyah, Rescue 1122 had made teams in community for volunteering during and after flood disaster hit the community. They gave training to community in collaboration with Doaba Foundation in 22 UCs. They gave training to community for boating and swimming and distributed first aid kits in each UC. First aid kits consist of tools to

deal with emergency situation. They also provide life jackets to community. They distributed fodder (Wanda) for livestock and manage the relief camps. They made 11 points to rescue flood victims. They pick and drop affectees to relief camps in city. There were 30 relief camps. All government departments worked together at the time of 2010 flood disaster. It is reported by CEO Education that education department played role in relief camps' management as head supporting staff and focal persons were all teachers. When government declared schools as relief camps, they had to shift all the furniture and equipment from school. This practice causes hindrances for students and teachers every time when flood hit the riverine area.

Tehsil Municipal Committee provides assistance to district administration. It had provided different services after flood like street lights repairing, clearing of damaged areas and de watering from flood affected areas. It had done rescue and evacuation of flood victims. In addition, health department provided services in emergency relief by setting up medical camps during flood near relief camps and also in community when they left for their places in flood affected areas. X.E.N Irrigation department Layyah claimed that Irrigation department had done maintenance works for the flood protection embankments (Bunds) in District Layyah as department gets annual budget for maintenance.

4.6.4 Early Warning System Installation in District Layyah

When asked about early warning system then 79% officials reported that E.W system was fully installed in 2016 by Doaba Foundation in District Layyah. The foundation had sent weather forecast and flood warning to District flood

control room and then government dispersed the early warning through Short Message Service (SMS) for 2016 flood warning.

4.6.5 Constraints in DRR and FRM During and after 2010 flood

There was not enough equipment at the time of flood 2010 to deal with the havoc and there was gap in availability of data as stated by 6 officials under DDMA Layyah. District Emergency Officer, Dr. Tasleem had told during interview, "Rescue 1122 got 2 boats from Civil Defense department, 55 Hp out boat engine, 8 boats and other new equipment in 2016 from PDMA. Now they have 60 boat operators and swimmers, life rings, fuel tanks, rescue vehicle and generator".

43% (6) officials reported that the major constraint in FRM during and after 2010 floods was non availability of data and this caused duplication of resources. Similarly, 35 % officials told that lack of community awareness was a severe issue during 2010 floods. CEO Health reported that shortage of medicines was also a major issue. DDMC Layyah, Mr. Junaid who was appointed by PDMA stated that now government is investing in assessment or data collection so that resources would not be wasted during emergency relief and response.

4.7 ANALYSIS OF INTERVIEWS WITH ORGANIZATIONS' OFFICIALS IN DISTRICT LAYYAH

The third objective of study is to examine the role of organizations in FRM and resilience building in the aftermath of 2010 flood event. Therefore, 10 in-depth structured interviews were conducted with representatives of different organizations.

4.7.1 Experience of Interviewees

The interviewees having 11-15 years of working experience with organizations were 30 % (3) while 20% (2) have up to 5 years of experience. Moreover, 6 to 10 years experienced interviewees were found 50% (5) in different INGOs, NGOs and local organizations.

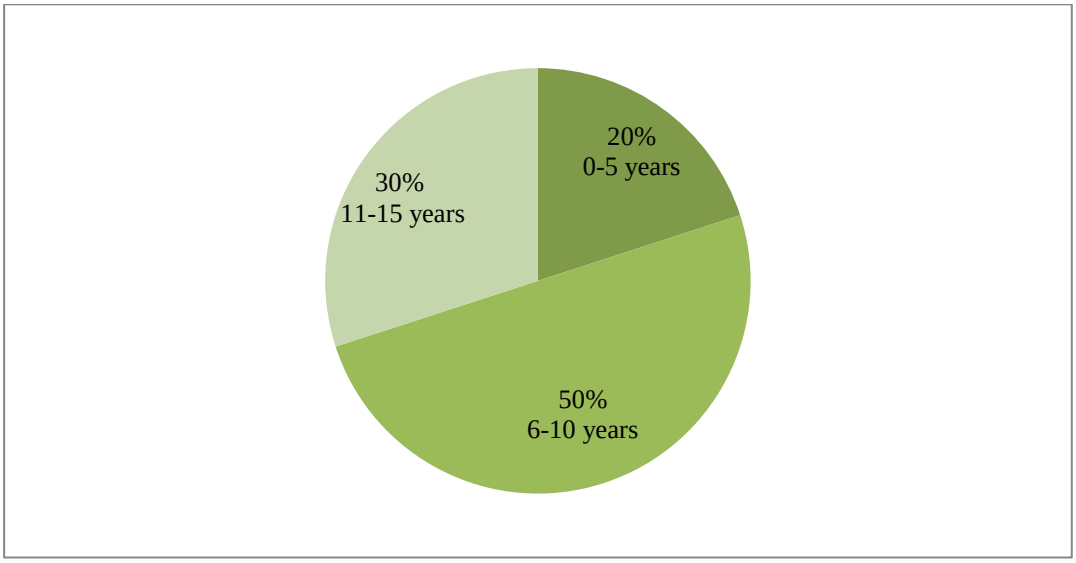

Figure 19: Experience of NGOs officials

4.7.2 Qualification of Interviewees

The education level of interviewees has shown in fig. below. The highest level was 16 years of education and 60 % interviewees had it while 14 years of education was minimum level possessed by 10 % of interviewees. Moreover, 30 % officials had 18 years and above education level in different organizations of district Layyah.

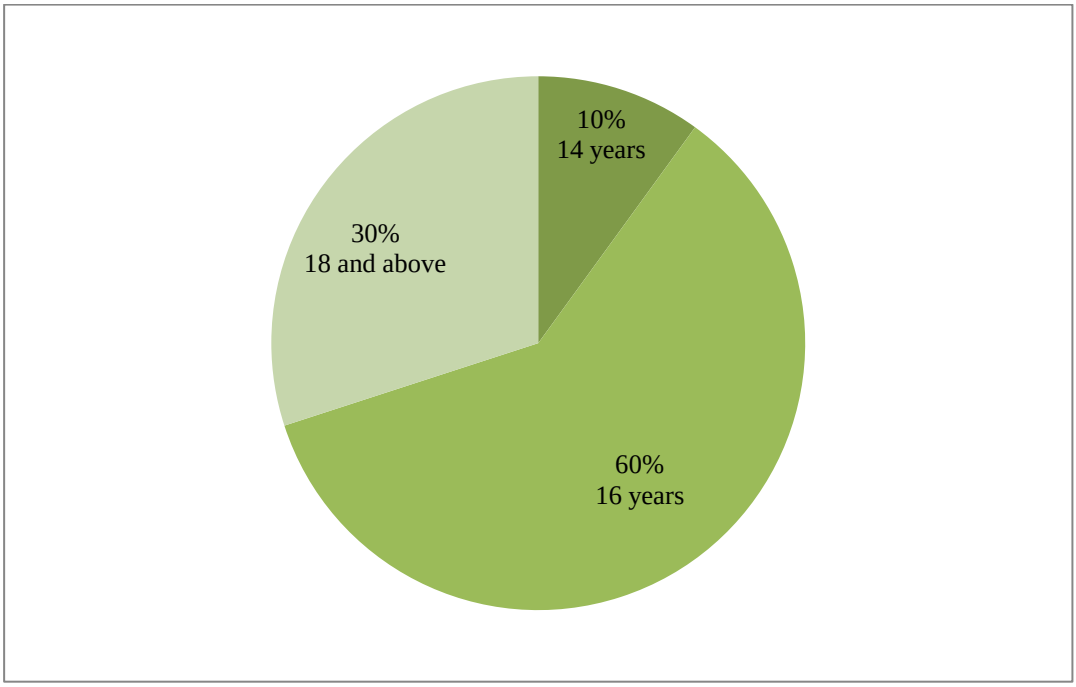

Figure 20: Qualification of NGOs officials

4.7.3 Role of NGOs

4.7.3.1 Emergency relief and rescue

It has found that 70% of organizations played role in emergency relief and recue during 2010 floods in district Layyah. Most of the organizations were local NGOs while national and international organizations had provided services. Their names are Doaba Foundation, Punjab Ruler Support Program (PRSP), Aas Welfare Society, Awami Development Authority (ADA), Sustainable Development Institute (SDI), Roshni Welfare Society and Solidar. The district manager PRSP said that they provided vehicles for delivering flood victims from community to relief camps. They gave cooked food and non-cooked food items in relief camps. They raised fund and bought rice, sugar, flour, dry fruits, clothes and then distribute packets in 10,224 people. They had set up medical and livestock camps for three days near relief camps. Free medicine and vaccination were given to flood

victims and their livestock. Similarly, ADA had formed 700 community organizations as reported by assistant director of ADA. Their volunteers took part in evacuation and rescue operations. They took part in early warning by announcing on mega phones, made temporary washrooms for flood victims in relief camps and gave 10000 hygiene kits. They got funds from International donors, philanthropists and also NGO staff had given their one month salary. They delivered 45000 food hampers along with blankets and quilts as each hamper had 20 kg weight carrying flour, sugar, rice, cereals for 10-15 days. Also, provided fodder for cattle. And, PLAN has given boats to local government for rescue operations.

4.7.3.2 Response

During interviews with NGOs' officials, it has counted that 90% of local, national and international organizations took part in floods 2010 response. Following are the responses of different organizations after 2010 floods in district Layyah:

- Doaba Foundation installed early warning system after 2010 flood. There was not early warning system in district Layyah before 2010 flood event. Foundation gets daily data for climate change from meteorological department and during rainy season, they get and record data three times a day via telephone call to Chashma Barrage. It had purchased software from Mobilink (Pakistan Mobile Communications Limited) and with its help, delivered flood warning to line departments and elected union council members. Theses members further put forward the warning through public

announcements in mosques of their respective villages so that people can evacuate by themselves the risk prone area.

- IDSP worked with community and made community organizations at each administration level. It had started a shelter support programme 2010-2016 with the objective of rehabilitation with community participation. NGO provided tool kit to victim families and they built walls of their houses with their share (material and labour) after then NGO provided them roofing materials which included polyethene sheet 16ft x16ft, 16ft steel girder, 12 bamboos (L=16ft) and 16ftx16ft sirki (pattal/kanna). Community raised 4ft to 5ft plinth level of their houses. They had provided 10,000 rooms to flood victims.
- Awami Development Authority has formed 700 community organizations and took part in rehabilitation. It had made 770 houses with one room and one wash room. Room size was 12ft x15ft and wash room size was 6ft x 5ft. They delivered WASH lectures in community. For economic resilience ADA gave mason trainings to get their livelihood in union council Lohanch Nashaib and Sahu Wala. Assistant Director of ADA told that they installed hand pumps, and reconstructs 500 culverts in riverine area. They gave trainings on how to rescue a drowning man in community with the collaboration of Rescue 1122 Layyah. They did surveys and arranged workshops in affected areas. They provide psychological treatment sessions.

- SDI played role in rehabilitation and provided roofing materials for 1000 houses in affected community. They have started to hold monthly meetings with community and opened 30 non-formal schools in riverine area.
- Solidar opened 46 schools by following core humanitarian standards and provided WASH facilities in flood-affected communities.
- PLAN is a child centred organization. It has done with flood damage assessment. Major intervention was in WASH, DRR and livelihood. It has done reconstruction of schools and hospitals. They had played role for economic empowerment. They gave technical training to youth. They gave boats to government and their partners. They provided fodder.
- Amina Educational Foundation opened non-formal schools in affected areas and providing free education to children. This organization also works for environmental issues in collaboration with other NGOs.

4.7.4 Scope

Table below shows the scope of different organizations that provided services in district Layyah during and after 2010 floods. 30 % of the NGOs were working for DRR and 80% were involved in resilience building of flood-affected communities. These NGOs are currently active in district Layyah for strengthening flood risk management and resilience of vulnerable communities.

Table 4-10: Scope of NGOs

Sr.#	NGO Name	Scope
1.	Doaba Foundation	Disaster Risk Reduction, WASH & Lively Hood
2.	PRSP	Micro Finance
3.	Plan Pakistan	DRR, WASH
4.	Solidar International	Rehabilitation
5.	Awami Development Authority	Lively hood & Emergency Response
6.	Aas Welfare Society	Health
7.	IDSP	Relief, Rehabilitation, Education
8.	SDI	Emergency response, advocacy
9.	Roshni Welfare	DRR & Emergency Response
10.	Amina Educational Welfare Society	Education, Environment

4.7.5 Initiatives for Learning and Awareness of Vulnerable Communities to Cope With and After 2010 Floods

It has been calculated that 60 % of NGOs took initiatives for the awareness and learning of vulnerable communities to reduce the flood risks and to cope with it. PLAN, Solidar and Doaba Foundation provided WASH facilities in relief camps and delivered WASH lectures in flood affected communities during flood response. Similarly, Awami Development Authority delivered WASH lectures and gave trainings in collaboration with Rescue 1122, Layyah; on how to rescue a drowning man into flood waters. While, Aas Welfare Society gave trainings on WASH activities in schools in association with Rescue 1122, Layyah and arranged sessions to reduce the psychological effects in flood victims. Moreover, Roshni Welfare

organized street theatres for the awareness and learning of flood risk and its management in affected communities of 2010 and after floods.

4.7.6 Involvement in Annual Flood Fighting Plan for District Layyah

When asked about the involvement of organizations in formulation of annual flood fighting plan, 80 % NGO officials claimed that there is no coordination between government and NGOs regarding flood risk management and annual flood fighting plan. Only 20% officials proclaimed that NGOs have good integration with line departments. During interview with Project Coordinator of Doaba Foundation stated during interview that Doaba Foundation had developed flood fighting plan for district and delivered it to local government. Since 2010 to 2015, consistent flood fighting plans were followed by district government. Although in 2016, Doaba Foundation has updated the flood fighting plan for district Layyah.

4.7.7 Constraints That Mar Emergency Relief, Response and DRR Mechanism during 2010 Floods

Following are the constraints that mar the emergency relief, response and DRR mechanism during 2010 floods:

- **Lack of coordination**

  60% interviewees of NGOs stated that there was no coordination between organizations and line departments for planning and disaster risk management.

- **Lack of trust**

  There was lack of trust between line departments and NGOs because issuance of NOC was very difficult before starting of any DRR project as stated by 4 NGOs officials.

- **Absence of transparency**

  Due to accountability issue, there was no bondage between INGOs, NGOs and line departments which caused overlapping in delivering food and other relief goods among flood victims of 2010 as reported by 30% NGOs officials.

4.7.8 Infrastructure Resilience

In district Layyah, 1 NGOs has worked for Infrastructure resilience of flood affected community. Doaba Foundation has built 5 feet elevated embankment or bund around moozaz/Bastiz, provided tool kit to communities and participated in building it. NGO gave daily wage to volunteers who have taken part in erection of flood protection bund. While during field survey, a project of The NGO World Foundation (Pakistan) with Turkish finance was observed. Nearly 15 families were shifted to newly built colony named as 'Light House' in Kotla Haji Shah. It has been witnessed that each house has sewerage and drainage system although houses built by IDSP (local NGO) have no drainage and sewerage system in Lohanch Nashaib.

4.7.9 Economic Resilience

Following NGOs have been working for economic resilience of flood affected communities in district Layyah as stated by 60 % officials:

- Doaba Foundation distributed seed, fertilizer, oil extractor, grind mills and also goats to people so that they could revive their livelihoods. It has given technical training to youth like mobile repair and tailoring skill.
- Awami Development Authority gave sewing machines to females so that they make living for their family after disaster. It has distributed seeds and fertilizer to farmers.
- SDI had started efforts for livelihood sources for the flood affected people. It gave 6 months training to teenagers and adults and gave sewing machines to females which help them to increase their income.
- Likewise, Solidar had done livelihood project for 27 months in affected community.
- Plan had played role for economic empowerment and gave technical trainings to youth.

4.8 CONCLUSION

The 2010 floods in district Layyah revealed major communication and policy gap in flood risk management between local government and NGOs. The flood risk management should be upgraded by integrating community resilience within as it is concluded that communities of Bakhri Ahmed Khan, Kotla Haji Shah and Sahu Wala local were able to fundamentally restore its living status and to curtail long run vulnerability using their resources in addition to government and NGOs support. These three communities were considered as social and Infrastructural resilient as an idea of community resilience to disasters has gained significant impact in the last decade which help policy makers and practitioners to

identify the strengths and vulnerabilities of particular populations endangered by floods (Walters, 2015). Although, people of Lohanch Nashaib were not infrastructurally and economically resilient but found to be socially resilient. There is no Planning and coordination between government and NGOs for flood risk management due to which satisfaction level of affected communities in all four union councils towards government's emergency relief and rescue has been found to be very low. Hence, strengthening local government institutions at union council and district level is a major implication for disaster mitigation at national level as concluded by (Deen, 2015). In Bakhri Ahmed Khan, satisfaction level was very high in favour of government's long-term assistance as compared in other three localities, which depicts the biasness of government officials. While, people were not satisfied with organizations long term assistance as they helped in reconstruction and resilience building of community because NGOs have not monitoring and evaluation system. The national and international NGOs come forward with projects only when the flood comes in an area and leave right after the completion of their projects. The study also highlights lack of institutional resilience in all line departments under DDMA. The findings of study by (Schelfaut et al., 2011) contributes towards tackling challenges and adds details about the opportunities and ways to promote resilience and truly bring it into practice. The findings revealed that participation of all stakeholders and communities enhance the resilience against flood. They are well-prepared, better aware and quite knowledgeable about the risks and respond much better in case of a flood. The utilization of the different tools for flood management, like the management plans and the early warning systems can act as catalysts towards

increasing the awareness and preparedness. Similarly, risk communication during event falls under the domain of risk communication and perception. Moreover, Institutional cooperation and coordination, preparation of emergency services and spatial planning are primary indicators for resilience of policies and institutions (Schelfaut et al., 2011).

4.9 RECOMMENDATIONS

- The most important measure of increasing flood resilience in a community is to increase the level of awareness and train the locals so that they are prepared to deal with floods. Some of the preparations include supply of sand bags, building the houses on elevated platform, avoiding storage of food in basements, evacuation plans, being able to recognize the early warnings and knowing the emergency procedures.
- NGOs have limited time and budget so Government should do focus on trainings and mock drills of flood prone community for first aid and emergency response including evacuation. There is a need to build a proper channel of communication between line departments, NGOs and community. Due to lack of education and awareness people can't differentiate between the understanding of their right and obligation. People give less time for trainings and awareness programs so NGOs should provide them daily wage to compensate their loss.As it is stated by (Srivastava & Shaw, 2015)for the educational and training programmes, two solutions i) cash for work and ii) food for work are considered while talking about community's economic resilience.

- Furthermore, policy making and risk analysis help in understanding and predicting the responses of the public to flood hazard by improving communication among the locals, the professionals and all the decision makers. Communication basically includes spreading awareness among people and to increase their preparedness for dealing with disasters. Awareness and communication should mainly include correct and up to date information about the risks of floods during crisis, announcing alerts and making decisions during emergencies as it is clear that the perception of risk stems from communication about the risks and determines how the locals will apprehend these risks (Schelfaut et al., 2011).
- Government should build flood protection bunds and NGOs focus on gender sensitivity issue for DRR trainings in local community. Flash floods are the main cause of flooding in district Layyah. There is a need to focus on community awareness and periodic sessions on WASH, DRR, environment and health.
- There is also a need of updated flood maps of riverine area. Government should take steps to lessen the soil erosion in riverine delta. The process of soil erosion is still ongoing in two union councils of District named as Lohanch Nashaib and Bakhri Ahmed Khan. As the action plan 2020 for integrated flood risk management on River Rhine suggests initiating of afforestation projects under non- structural goals (Society, 2014). PDMA didn't appoint any representative in district since 2011.
- In order to make DRR effective government should adopt a strategy that can give permanent solution like the regulation of Lala Kareek with fixed

equipment. Need assessment and resource planning are crucial. Government and organizations should focus on preparedness, early recovery and livelihood sources of affected community.

- Community should follow seasonal calendar so that crop damages can be reduced.
- Government should appoint proper staff for relief camps management instead of patwari (local representative) and teachers.
- There must be a contingency plan at union council and village level for flood risk management and guidelines must be followed by community and line departments.
- Rural Resilience, on the other hand is under researched and comparably neglected concept It is defined as the extent to which a particular rural area is capable to tolerate transformations before reforming around a new establishment of structures and procedures (Srivastava & Shaw, 2015). In rural areas, resilience of community can be boosted by provision of varied occupations in one household as it provides better economic surety as stated in one of the studies of (Ellis, 2000) on developing countries. Looking into the literature, it has been found that rural population depends on urban area whenever disaster hit in rural areas (Paul, 2005; Srivastava & Shaw, 2015). So, district Layyah government should focus on enhancing rural resilience in the face of annual flooding.

References

Baker, J. L. (2012). Climate Change, Disaster Risk, and the Urban Poor: Cities Building Resilience for a Changing World. World Bank Publications.

Brears, Robert C. (2015). Integrated Flood Risk Management in India and the South Asia region: Lessons from the Rhine.In M.-B. U. Stumbaum (Ed.), (pp. 15). Berlin, Germany: FreieUniversität Berlin.

Brisbane 2011. Habitat International, 50, 51–56. https://doi.org/10.1016/j.habitatint.2015.08.004

Commission, Women's Refugee. (2009). Building Livelihoods: A Field Manual for Practitioners in Humanitarian Settings. New York.

Cutter, S. L., Barnes, L., Berry, M., Burton, C., Evans, E., Tate, E., & Webb, J. (2008).A place-based model for understanding community resilience to natural disasters. Global Environmental Change, 18(4), 598–606. https://doi.org/10.1016/j.gloenvcha.2008.07.013

Deen, S. (2015).Pakistan 2010 floods. Policy gaps in disaster preparedness and response. International Journal of Disaster Risk Reduction, 12, 341–349. https://doi.org/10.1016/j.ijdrr.2015.03.007

Deen, Samar. (2015). Pakistan 2010 floods. Policy gaps in disaster preparedness and response. International journal of disaster risk reduction, 12, 341-349.

Djordjević, S., Butler, D., Gourbesville, P., Mark, O., &Pasche, E. (2011). New policies to deal with climate change and other drivers impacting on resilience to flooding in urban areas: the CORFU approach.

Environmental Science & Policy, 14(7), 864–873. https://doi.org/10.1016/j.envsci.2011.05.008

District at a Glance Layyah.(1998). pbs.gov.pk. Retrieved 3 May 2017, from http://www.pbs.gov.pk/sites/default/files//tables/District%20at%20a%20glance%20Layyah.pdf

Ellis, Frank. (2000). The determinants of rural livelihood diversification in developing countries. Journal of Agricultural Economics, 51(2), 289-302.

Gluck, C. (2011). Ready or Not Pakistan's resilience to disasters one year on from the floods (Rep.).Oxfam.

ISDR, UN. (2009). UNISDR terminology on disaster risk reduction. Geneva, Switzerland, May.

Jha, A. K., Bloch, R., &Lamond, J. (2012). Cities and Flooding: A Guide to Integrated Urban Flood Risk Management for the 21st Century. World Bank Publications.

Jha, Abhas K, Bloch, Robin, &Lamond, Jessica. (2012). Cities and flooding: a guide to integrated urban flood risk management for the 21st century: World Bank Publications.

Khalili, S., Harre, M., & Morley, P. (2015). A temporal framework of social resilience indicators of communities to flood, case studies: Waggawagga and Kempsey, NSW, Australia. International Journal of Disaster Risk Reduction, 13, 248–254. https://doi.org/10.1016/j.ijdrr.2015.06.009

Klijn, F., Merz, B., Penning-Rowsell, E. C., &Kundzewicz, Z. W. (2015). Preface: climate change proof flood risk management. Mitigation and Adaptation Strategies for Global Change, 20(6), 837–843. https://doi.org/10.1007/s11027-015-9663-y

Kundzewicz, Z. W., Kanae, S., Seneviratne, S. I., Handmer, J., Nicholls, N., Peduzzi, P., …Sherstyukov, B. (2014). Flood risk and climate change: global and regional perspectives. Hydrological Sciences Journal, 59(1), 1–28. https://doi.org/10.1080/02626667.2013.857411

Kundzewicz, Zbigniew W, &Kaczmarek, Zdzislaw. (2000). Coping with hydrological extremes. Water International, 25(1), 66-75.

Li, W., Xu, B., & Wen, J. (2016). Scenario-based community flood risk assessment: a case study of Taining county town, Fujian province, China. Natural Hazards, 82(1), 193–208. https://doi.org/10.1007/s11069-016-2187-2

Liao, K.-H.(2012). A Theory on Urban Resilience to Floods--A Basis for Alternative Planning Practices.Ecology and Society, 17(4). https://doi.org/10.5751/ES-05231-170448

Lingard, L., Albert, M., & Levinson, W. (2008).Grounded theory, mixed methods, and action research. BMJ, 337(aug07 3), a567-a567. http://dx.doi.org/10.1136/bmj.39602.690162.47

Parker, DJ.(2000). Introduction to floods and flood management. Floods, 1, 3-39.

Paul, BimalKanti. (2005). Evidence against disaster-induced migration: the 2004 tornado in north-central Bangladesh. Disasters, 29(4), 370-385.

Prasad, N., Ranghieri, F., Shah, F., Trohanis, Z., Kessler, E., & Sinha, R. (2009). Climate Resilient Cities: A Primer on Reducing Vulnerabilities to Disasters. World Bank Publications.

Restemeyer, B., Woltjer, J., & van den Brink, M. (2015). A strategy-based framework for assessing the flood resilience of cities – A Hamburg case study.Planning Theory & Practice, 16(1), 45–62. https://doi.org/10.1080/14649357.2014.1000950

Rural Development Policy Institute. (2013). Retrieved from http://www.alnap.org/resource/8307

Schelfaut, K., Pannemans, B., van der Craats, I., Krywkow, J., Mysiak, J., & Cools, J. (2011). Bringing flood resilience into practice: the FREEMAN project. Environmental Science & Policy, 14(7), 825–833. https://doi.org/10.1016/j.envsci.2011.02.009

Schelfaut, K, Pannemans, B, Van der Craats, I, Krywkow, J, Mysiak, J, & Cools, J. (2011). Bringing flood resilience into practice: the FREEMAN project. Environmental Science & Policy, 14(7), 825-833.

Stead, D. (2014). Urban planning, water management and climate change strategies: adaptation, mitigation and resilience narratives in the Netherlands. International Journal of Sustainable Development & World Ecology, 21(1), 15–27. https://doi.org/10.1080/13504509.2013.824928

Society, The Royal. (2014). Resilience to extreme weathers.

Srivastava, Nitin, & Shaw, Rajib. (2014). Establishing parameters for identification of vulnerable occupations in a disaster scenario in Gujarat, India. Risk, Hazards & Crisis in Public Policy, 5(2), 212-238.

Srivastava, Nitin, & Shaw, Rajib. (2015). Occupational resilience to floods across the urban–rural domain in Greater Ahmedabad, India.International journal of disaster risk reduction, 12, 81-92.

Tariq, M. A. U. R., & van de Giesen, N. (2012). Floods and flood management in Pakistan. Physics and Chemistry of the Earth, Parts A/B/C, 47–48, 11–20. https://doi.org/10.1016/j.pce.2011.08.014

Velasco, M., Cabello, À.,& Russo, B. (2016). Flood damage assessment in urban areas. Application to the Raval district of Barcelona using synthetic depth damage curves. Urban Water Journal, 13(4), 426–440. https://doi.org/10.1080/1573062X.2014.994005

Vis, M., Klijn, F., De Bruijn, K. M., & Van Buuren, M. (2003). Resilience strategies for flood risk management in the Netherlands. International Journal of River Basin Management, 1(1), 33–40. https://doi.org/10.1080/15715124.2003.9635190

Walters, Peter. (2015). The problem of community resilience in two flooded cities: Dhaka 1998 and Brisbane 2011. Habitat International, 50, 51-56.

Annex-I

Community Questionnaire

Dear respondents, this questionnaire is prepared for academic purpose only. It will be helpful in completing MS research thesis on **"An Integrated Flood Risk Management through Community Resilience in District Layyah"**. Therefore, any answers given shall be treated as confidential. It's a kind request to fill this questionnaire without any hesitation.

Thank you in advance for your cooperation!!!

(January 2017)

Locality (U.C) . . . . . .

1.	What is your Gender?

☐ Male ☐ Female

2.	What is your Age?

☐ 30-35 ☐ 36-40 ☐ 41-45 ☐ 46-50 ☐ 51-55

3.	What is your highest Educational level in Years?

☐ No formal education ☐ Primary (upto class 5) ☐ Middle (upto class 8)

☐ Matric ☐ Intermediate ☐ Bachelors ☐ Masters

4.	What is your family system?

☐ Single ☐ Joint

5.	What is your house hold size?

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

6.	How many bread winners in your household?

☐

Social Resilience

Variable : Community participation

7.	How did your community work together to get back to normal routine after 2010 flood?

☐ Clean Houses and Community ☐ Gather material and helped themselves

☐ Did nothing waited for help

8.	What knowledge did you gain about flood mitigation and adaptation after 2010 flood? please specify local indigenous practices for protection of flood.

☐ Evacuate after Early Warning came ☐ Raised Plinth Level of Houses

☐ Use of Tractor Tubes ☐ Use of Sandhari (Made of Goat Skin)

Social Resilience

9.	Did you get support from your primary social network/group?

Social Group	Yes	No	Type of Support		
			Food	Emergency Shelter	Financial/Soft loan
Family/Relatives					
Friends					

10. Did you get support from your social Institutions?

Social Institutions	Yes	No	Type of Support		
			Food	Emergency Shelter	Financial
Political Institutions/Leadership					
Government					
NGOs					

Social Resilience

11. Did you get injury in your family member due to 2010 flood event?

☐ Yes ☐ No

If Yes then specify

Sr. No		
1.	No.ofFamily Members	
2.	Gender	
3.	Age	

12. Which disease had you suffered during flood 2010?

☐ Malayria ☐ Eye Ailments

☐ Skin Diseases ☐ Diarrhea

13.	Which institution helped you to recover from health issues and how?

Social Institutions	**Yes**	**No**	**How did they helped You**
Government			
NGOs			

14.	Did you receive trauma care from institutions?

Social Institutions	**Yes**	**No**	**How did they reduce psychological effects**
Government			
NGOs			

Economic Resilience

15.	What is your primary occupation?

☐ Laborers ☐ Farmer ☐ Housewife

☐ Self-employed (individual works for himself/herself and earns profit directly from business or trade)

☐ Unemployed

Other, please specify _____

16.	How much extent did the following get damage during 2010 floods?

Sr. No.	Type	Damage Extent					Approx.Cost in Rupees
		Extremely	Very	Moderately	Slightly	Not at all	
1.	House						

2.	Crop						
3.	Land/Property						
4.	Livlihood						

17. How Were you able to get back your livelihood sources after 2010 flood?

☐ By working at Brick Kilns ☐ By working at Block Making local industry

☐ By cutting vegetables in fields on daily wages

18. Did you have any alternative source of income ?

☐ Yes ☐ No

If yes, then then what type of source please specify

_____

19. Did you have any savings?

☐ Yes ☐ No

20. Were the following services disrupted due to 2010 floods?

Sr.No	Utilities	Yes	No	Duration of unavailability
1.	**Power Supply**			
2.	**Water Supply**			
3.	**Telecommunication**			
4.	**Transport Facilities**			

Infrastructure Resilience

21. What did you do with your house after 2010 flood event?

☐ Repair ☐ Rebuild

& who helped you? Please specify _____

22.	Were the following infrastructure damaged due to 2010 floods?

Sr.No	**Infrastructure**	**Extremely**	**Very**	**Moderately**	**Slightly**	**Not at all**	**Duration of unavailability**
1.	**Roads**						
2.	**Hospitals**						
3.	**Schools**						

23.	What did you do in order to protect your infrastructure from other floods which came after 2010?

☐ Protection Bund around houses ☐ Raised Platform

Institutional Resilience **Variable :Flood Characteristics**

24.	Had you been served by early warnings by Government before 2010 flood event?

☐ Yes ☐ No

If yes, answer 19 & 20

25.	How early were you warned of incoming flood?

☐ 1-4 days ☐ 5-8 days

☐ 9-12 days ☐ 13-16 days

26.	Which means of communication was used for flood warning?

i) Tv ☐
ii) Radio ☐
iii) Public announcements in mosques ☐
iv) Local area representative ☐

Institutional Resilience **Variable : Relocation**

27.	Did Government invest on educational and learning programme on flood risk and emergency services after 2010 floods to cope with future floods?

Sr.No	Awareness Campaign in	Yes	No
i.	Schools		
ii.	Community		

Institutional Resilience **Variable :Assistance to Recover**

28.	What is your satisfaction level with respect to recovery and resilience building after 2010 flood event?

	Satisfaction Level	Very Satisfied	Satisfied	Neither	Dissatisfied	Very Dissatisfied
i.	Government role in emergency relief and recovery					
ii.	NGOs role in emergency relief and recovery					
iii.	Understanding of Early Warning systems installed after 2010 flood					

29.	What is your satisfaction level with respect to assistance received from Government and NGOs?

	Satisfaction Level	Very Satisfied	Satisfied	Neither	Dissatisfied	Very Dissatisfied
i.	Government					
ii.	NGOs					

30.	Give comments to enhance flood risk management and resilience against floods in your area?

☐ Sewerage system for community ☐ Provide Education to Children

☐ Permanent place in city ☐ Employment opportunities in city

Annex-II

Questionnaire for Government Officials

Dear Sir, this Interview is structured for academic purpose only. It will be helpful in completing MS research thesis on **"Integrated Flood Risk Management through Community Resilience in District Layyah"**. Therefore, any answers given shall be treated as confidential. Your co-operation, input and support in this regard will be acknowledged and appreciated.

Thank you in advance for your cooperation!!

Department Name . . . . . **Designation** . . . . . .

Q 1. Please share briefly the role of DDMA in Flood Risk Management of District Layyah?

Q 2. What is scope of your department in FRM?

Q 3. How and when the Early Warning system was put in place/structured?

Q 4. What initiatives did DDMA strategize to bring the affected people back to normal life after the 2010 floods?

Q 5. Which departments were directly involved in response/relief and recovery phases in 2010 floods and what were their assigned roles?

Q 6. In addition to early warning system, what other methods are being used to make the communities aware of and prepare for any future floods in the district?

Q 7. Are you using scientific methods and technology for the effective flood risk management and DRR initiatives?

Q 8. Do NGOs participate in decision making of Annual Flood Fighting Plan for the district? If yes, then how?

Q 9.Do community participate in Annual Flood Fighting Plan? If yes, then how?

Q 10. How did NGOs extend their cooperation with you in your recovery and resilience building programmes for the affected community after 2010 floods?

Q 11. To what extent the guidelines of Flood Fighting Plan have been followed by the respective departments in managing flood risks and undertaking DRR initiatives?

Q 12. What are your constraints in implementing the DRR and Resilience Building plans for the people living in flood prone areas of Layyah City?

Q 13. What should be done according to your opinion to ensure better DRR and Resilience Building plans for flood prone areas of Layyah City?

Q 14. What did you do for building Social Resilience of affected Community? (Problems and Suggestions)

Q 15. What did you do for enhancement of Economic Resilience in community? (Problems and Suggestions)

Q 16. Which initiatives were taken by you for Infrastructure Resilience in community? (Problems and Suggestions)

Q 17. Give Suggestions to enhance Institutional resilience and Capacity?

Thank You for your time!

Annex-III

Questionnaire for NGO Officials

Dear Sir/Madam,

This Interview is structured for academic purpose only. It will be helpful in completing MS research thesis on **"Integrated Flood Risk Management Through Community Resilience in District Layyah"**. Therefore, any answers given shall be treated as confidential. Your co-operation, input and support in this regard will be acknowledged and appreciated.

Thank you in advance for your cooperation!!!

NGO Name . . . . . **Designation** . . . . . .

Q 1. Please explain the role of your NGO in recovery of people affected during 2010 floods?

Q 2. What is scope of your NGO?

Q 3. What initiatives did you strategize for the learning and awareness of vulnerable communities to prepare them to cope with the future floods in the aftermath of 2010 floods?

Q 4. Do you have any plans in place for resilience building of people living in flood prone areas of Layyah City?

Q 6. Do you know of any modern or indigenous technology being used by the government of NGOs for flood risk management and DRR at local level?

Q 7. Is there any district level decision making mechanism where NGOs contribute to development of Annual Flood Fighting Plan for the district?

Q 8. Do the Government departments cooperate with NGOs in terms of supporting and facilitating in implementation of their project for recovery and resilience building of affected community after 2010 floods?

Q 9. What do you think are the constraints that mar the DRR and Resilience Building initiatives for the people living in flood prone areas of Layyah City?

Q 10. Did you find any gaps during and after the emergency response by your organization for the affectees of 2010 flood?

Q 11. What should be done according to your opinion to make the flood DRR and resilience building activities effective for flood prone areas of Layyah City?

Q 12. What did you do for enhancement of economic resilience in community? Problems and suggestions

Q 13. What did you do for building Social Resilience (measures for capacity building) of affected community? Problems & suggestions

Q 14. Which initiatives were taken by you for Building Infrastructure Resilience in community? Problems and suggestions

Q 15. Which initiatives were taken by you for Institutional resilience? Problems and suggestions

Thank You for your time!

Annex-IV

List of local government officials

Sr. #	DDMA Layyah	Official Name	Qualification	Experience
1.	Additional Deputy commissioner(R)	NaeemUllah Bhatti	16 years	11-15
2.	District Police Officer, Layyah	Muhammad Ali Zia (Rtd Captain)	18 nd above	6-10
3.	DDMC Layyah	Mr. Junnaid	16 y	6-10
4.	CEO Health	Ameer Abdullah Samtia	16 y	11-15
5.	CEO Education	KhalidaShaheen	18 and abve	6-10
6.	Additional deputy Commissioner (G)	Mahboob Ahmed	16 y	11-15
7.	District Emergency Officer, Rescue 1122, Layyah	Dr. Tasleem	18 and above	11-15
8.	XEN Irrigation, Layyah	Chief Exective Engr.	16 y	16 nd above
9.	Tehsil Municipal Officer (F), Layyah		12 y	6-10
10.	Exective Director, Awami Development Organization, Layyah	SaifullahHussaini	16	11-15
11.	District Coordinator, Doaba Foundation , Layyah	Mr. Mazhar Iqbal	16	11-15
12.	Civil Defence Officer, Layyah	M. YounusAnjum	14	11-15
13.	District Head, Social Welfare Department, Layyah	Mr. Zafar Iqbal Kharana	16	0-5
14.	Assistant &Incharge Flood Control Room, District Layyah	Ch. Abdul Rasheed	14	16 and above

Annex-V

List of NGO Officials

Sr.#	NGO Name	Level of operation	Location	Role or Sector/Cluster of work	Official Designation	Official Name
1.	Doaba Foundation	National	Layyah	Disaster Risk Reduction, WASH & Lively Hood	Project Coordinator	Mr. Yasir Hashmi
2.	PRSP	National	Layyah	Micro Finance	District Manager	Mr. Sajid Rao
3.	Plan Pakistan	International	Layyah	DRR, WASH	Coordinator cooperator	Mr. Amjad Ali
4.	Solidar International	International	Layyah	Rehabilitation	District Project Coordinator	Syed Imran Ali Shah
5.	Awami Development Authority	Local	Layyah	Lively hood &Emergency Response	Assistant Director	Mr. Siaf Ullah Hussaini
6.	Aas Welfare Society	Local	Layyah	Health	General Secretary	Mr. Qamar Zaman
7.	IDSP	Local	Layyah	Relief, Rehabilitation, Education	President	Mr. Mian Zahid Riaz
8.	SDI	Local	Layyah	Emergency response, advocacy	Chairman	Mr. KashifQadeer

9.	Roshni Welfare	Local	Layyah	DRR & Emergency Response	Exective Director	Nushat Yasmeen
10.	Amina Educational Welfare Society	Local	Layyah	Education, Environment	Chairman	Mr. Muhammad Jamshed