ARTS AND SOCIAL SCIENCES - VOL. 01 ISSUE 01 PP. 31-41 (2020)

European Academy of Applied and Social Sciences – www.euraass.com

Arts and Social Sciences

https://www.euraass.com/ass/ass.html

Research Article

Role of Institutions in Combating the Effects of Flood Hazard in Punjab- A Case Study of District Chiniot

Syed Javed Hussain Shah[a, b]*

[a] *Lecturer in Geography, Govt. K.A. Islamia Degree College, Jamia Muhammadi Sharif, Chiniot.*

[b] *PhD scholar, The University of the Punjab, Lahore, Pakistan.*

Received: 05 August 2020 / Revised: 17 September 2020 / Accepted: 06 November 2020

Abstract

Naturally occurring events such as earthquakes, volcanoes, floods etc. cast great impact on physiography of land and lives of the people. Floods are the most common of all the natural hazards. Physical, social, economic and environmental vulnerabilities make the developing countries more susceptible to disasters as compared to the developed countries which have great sources and resources to cope with any disastrous situation. Pakistan is one of the most flood prone countries of South Asia and a number of floods have caused significant damage and loss both physically and economically particularly during the floods of 1950, 1992, 1998, 2010, 2011 and 2014.Theses floods are primarily caused by the heavy monsoon rainfalls accompanied by snow melting in the northern mountainous areas of the country. Among all the provinces, Punjab is most prone to floods and faces great damage and loss because it is the home of more than half of the country's population. As it is densely populated, so the destruction here is more than other provinces. Besides, Punjab's geographic location and climatic conditions make it more vulnerable to monsoon floods. Primary data from a field survey of the case study area through a questionnaire was obtained while the related secondary data was derived from different published government's reports, journals and already done work related to the topic. For graphical representation of work done, simple statistical techniques attributed with descriptive research were followed. This research is aimed to have an inner look into the structures and functions of the institutes which are working to combat the effects of floods in Pakistan. The main purpose of this study is to find out the plans and strategies of different institutions to combat the effects of floods.

Keywords: Physiography, disaster, vulnerable, monsoon, floods.

1. Introduction

Since the creation of the earth, it has been witnessing changing on its surface brought either by the agents of the nature i.e. wind, water or by the man living on it. Floods cannot be prevented but their effects can be reduced by introducing certain techniques and strategies i.e. advance warning system (Ali, 2013). The frequencies of the floods and their magnitudes rise due to the occupation of land with impervious surfaces and run-off systems (Wright, 2000). Physical, social, economic and environmental vulnerabilities made the developing countries more susceptible to disasters. Disasters such as floods not only affect the people but

**Corresponding author:* E-mail: javedhussainnaqvi211@gmail.com (S. J. Hussain Shah)
Available online: 30 December 2020
DOI: https://doi.org/10.34154/2020-ASSJ-0202-33-43/euraass
Journal reference: *Arts and Social Sciences,* 2020, 1(1): 31–41.
ISSN-E: 2743-4664

also the related environment. The floods cause damage to natural environment and also cause destruction to human settlement. They create disruption from housing to financial sector (Sharif et al., 2013). From 1991-2000, approximately 211 million people were affected across the world by the natural disasters and the floods alone were responsible for over two-thirds of them (United Nations Report, 2015).

The disasters have complexity in nature as they are result of both nature and human actions (Sayers et al., 2013). These disasters are not only caused by the natural events but are also produced by the social, political and economic environments. When a comparison is made, the disasters that are occurring in the present day are more expensive than those of the past (Wisner et al., 2003). The adverse economic conditions compel the people to reside in such areas and places that are more prone to natural disasters like flood plains (Morrisey & Resser, 2007). The number of people being affected by the hydrological events has doubled over the last 30 years (World Economic Forum, 2011). In the years from 1970 to 2008, about 6,530 events were recorded in the data base out of which 47.4% were of floods (Cavallo et al., 2010).

It is now commonly held that any climate change will bring changes in the frequency and intensity of extreme events such as floods (Crisei et al., 2002). The floods account for 65% of all the deaths related to disasters and the losses in the years from 1992 to 2001. From 1900 to 2012, there were about 4,035 floods in which about 6.9 people were killed, 3.6 billion affected and estimated total economic loss was $ 550 billion (Sayers et al., 2013). Flooding and wind storms have close relation with climate change that is why the number of disasters and storms reported globally has tripled over the past three decades (Klemas, 2015). There are different key factors for each hazard and the precipitation intensity is the key factor of floods as excessive amount of precipitation during a short period leads to flooding (Hong et al., 2012). In many areas of the world, there will be an increase in flood hazards due to climate change (Few et al., 2004). There is expectation of temperature rise, severe rains, floods, droughts and reduction in crops production in Pakistan due to climate change (Shakoor et al., 2011). Since the last few decades, Pakistan has been experiencing variation both in pattern and intensity of precipitation (Federal Flood Commission, 2014).

All around the world there are organizations and institutions working to combat the effects of the floods. The United Nations Development Program (UNDP) has launched different programs which are strengthening natural capacities related to flood mitigation, prevention and preparedness in the developing countries of the world. The International Strategy for Disaster Reduction (ISDR) was started by the General Assembly in the year 2000.

Table 1: Floods in Punjab 2010-2014.

Year/month	**2010 (July)**	**2011 (September)**	**2012 (September)**	**2013 (August)**	**2014 (September)**
Causes of flooding	**Indus, Chenab, Jhelum rivers**	**Sutlej and Hill Torrents**	**Hill Torrents, Rains in South**	**Chenab and Sutlej Nullahs**	**Jhelum and Chenab Nullahs**
Number of districts affected	11	12	3	9	16
Number of villages affected	1,810	335	110	1,628	3,484
Population affected	6.2	0.026	0.389	0.120	2.47
Number of deaths	262	4	60	109	286
Household damage	353,141	1,284	25,556	3,378	83,593
Area affected	5.23 MA	0.27 MA	1.96 MA	0.195 MA	2.413 MA
Livestock perished	3,572	59	898	81	737

Source: Provincial Disaster Management Authority (PDMA), Punjab, 2014.

Pakistan had experienced a variety of natural disasters in the past. Pakistan is one of the most flood prone countries of South Asia and a number of floods have caused significant damage and loss both physically and economically particularly during the floods of 1950, 1992, 1998, 2010, 2011, 2014 (The World Bank, 2012). In the past 60 years, Pakistan has faced 19 major flood events which resulted in loss of 106, 68 lives of human beings, accumulative flooding of about 594,700 km^2 area and affected about 166,075 villages across the country. The total fiscal loss was about US $ 30 billion (Federal Flood Commission, 2010). Details of loss of flood are given in Table 1. National Disaster Management Authority (NDMA), Water and Power Development

Authority (WAPDA), Pakistan Commission for Indus Water (PCIW) and Federal Flood Commission (FFC) are the main institutions working for mitigation and prevention of the floods in the country. Federal Flood Commission (FFC) is for flood control on the national level and to arrange financial and technical resources for implementation of flood management programs across the country.

The Provincial Disaster Authority (PDMA) is assisted and coordinated by Provincial Irrigation Department (PID) and Provincial Relief Organization (PRO). The Provincial Disaster Management Authority (PDMA) has set up a Command, Control and Communication centre to coordinate disaster response all over the province. In Punjab total length of embankments is 3,332 kilometers along the rivers and there are 496 spurs to control the floods (FFC, 2010). The methodology used was the Multi-sector Initial Rapid Assessment (MIRA), which has been developed with the National Disaster Management Authority (NDMA) and provincial level Disaster Management Authorities (DMAs). This method aims to use a rapid technique through interviews with key informants (MIRA, 2014). In the 2014 flood alone, the National Disaster Management Authority (NDMA) reported some 1.8 million persons affected in Punjab, with more than 42,795 houses partially and fully damaged. An estimated 2.413 million acres of cropped area has been affected in Punjab, most when crops were almost ready to harvest (MIRA, 2014).

1.2 Major government institutions and their functions

A number of government institutions are currently working on disaster risk management in Pakistan (NDMA, 2007). They are:

1.2.1 Agencies for Mitigation/Prevention

- Federal Flood Commission
- Provincial Irrigation Departments
- Pakistan Nuclear Regulatory Authority
- Water and Power Development Authority (WAPDA)/ Dams Safety Council

1.2.2 Preparedness and Response of Different Agencies

- Armed Forces
- Civil Defence
- Emergency Relief Cell
- Fire Services
- National Crisis Management Cell (NCMC)
- Pakistan Meteorological Department
- Police
- Provincial Communication and Works
- Provincial Food Departments
- Provincial Health Departments
- Provincial Relief Commissioners
- Provincial Agriculture and Livestock Departments
- Space and Upper Atmospheric Research Commission (SUPARCO)

1.2.3 Agencies for Recovery and Reconstruction

- Earthquake Reconstruction and Rehabilitation Authority (ERRA)
- Provincial Irrigation Departments

1.2.4 Projects and Plans of Govt. Institutions Related Combating Floods

For prevention and controlling the effects of the floods, various institutions and organizations are working all over the world. According to the United Nations Report (1998), if the activities are managed within the flood prone area, the damage of the floods can be reduced significantly. It was also suggested in the report that construction of protective works such as flood storage reservoirs, diversion of water and levees along flood way can reduce the damage many times that is caused by the floods. The “best practice document”, which is an update of the United Nations and Economic Commission of Europe (2000) says about the document that it is aimed with objective to describe the best practices to prevent, protect and mitigate the adverse impact of the floods on human health and safety, on vulnerable goods and property and on the aquatic and terrestrial environment. More than 120 countries of the world have gone through the practice of legal or policy reforms since 2007 and more than 190 countries have

established focal points for disaster risk reduction and 85 countries have created national multi stakeholders platforms (United Nations, 2015).

Disaster management in Pakistan essentially revolves around flooded areas with a primary focus on rescue and relief. After the occurrence of each disaster, the government spends resources at rescue, relief and rehabilitation. Manzoor et al., (2013) explain that the floods in Indus basin are of common occurrence. The most frequently occurring floods damaging the agriculture are due to monsoon rains. These floods can be reduced in intensity by constructing bunds and storage reservoirs.

The role of various federal and provincial institutions and authorities for preventing the floods and reducing their effects on the community is most prominent. The plans, action framework and strategies of these safety disaster institutions are both structural and non-structural. The structural plans include the construction of river banks, levees, reservoirs, aligning the water courses, removing the hurdles on the river courses, proper caring of the water sheds, wise harvesting of the rain water particularly that of monsoon. Sayers et al., (2013) in their report on "Flood Risk Management" explain that throughout 1960s to 1980s, the world relied on the structural frameworks to stop or at least to minimize the effects of the floods. The channelization of the river can not only prevent flooding but also is helpful in improving the drainage and continuation of navigation. The non-structural measures include the conducting of training workshops, enhancing capacity building, disaster risk reductions measures, community awareness campaigns and other such activities.

1.2.5 Federal Flood Commission (FFC)

Since 1977, when this institute was formed, it has completed 3 National Flood Protection Plans (NFPP) each of ten years duration. This plan was from 1978-1988 in which about 311 flood protection schemes were completed in Azad Jamu & Kashmir (AJ&K), Northern areas (now Gilgit-Baltistan) and Federally Administered Tribal Area (FATA). In these schemes main emphasis was laid on constructing flood protection structures. This plan was formulated for a period of ten years from 1988-1998. In this plan 250 flood protection schemes were executed related to improvement in Flood Forecasting and Warning System under the project head Flood Sector Protection Project (FSPP-1). Meanwhile 10 schemes were completed under Prime Minister's River Management Program 1994-1996. In 1988, 2,028 damaged structures of varying nature were restored under Flood Damage Restoration Project and later in 1992, this figure was 1980.

This plan covers the decade of 1998-2008. During this plan, total 362 schemes were carried out in Azad Jamu & Kashmir (AJ&K), Northern areas (now Gilgit-Baltistan) and Federally Administered Tribal Area (FATA). Meanwhile, 21 projects were completed under Special Grant Through President/ Chief Executive Directive (2000-2002). In Flood Protection Sector Projects-II, 101 schemes were carried out related to upgradation of existing flood Forecasting and Warning System. The Flood Forecasting and Warning System for Lai Nullah Basin (Islamabad & Rawalpindi) were set up as well.

1.2.6 National Disaster Management Authority (NDMA)

Under the auspices of national government, the National Disaster Management Authority (NDMA) has responsibility of taking measures for the prevention of disasters, their mitigation and preparedness and capacity building to cope with the disaster situation as required.

It is a coordinating body whose most of the work is to organize and cooperate with other agencies, authorities and institutes. The action plan of National Disaster Management Authority (NDMA) includes following segments upon which emphasis is laid to combat the effects of flood hazard;

- It provides available staff or resources for the purpose of emergency, response, rescue and relief.
- It organizes assessment of disaster affected areas and determines the extent of damage and loss and required relief.
- It coordinates with all the concerned departments, agencies and institutes for emergency response and resources mobilization.
- It provides food and non-food items to the affected population. It prepares a transition plan from relief to recovery.

2. Data and methodology

Both primary and secondary data was collected for this research work. In the secondary data previous done work by others was studied while in primary data collection survey was conducted to different institutes working for the flood prevention and

mitigation in Pakistan. A field survey was also conducted of the district Chiniot and data was collected through questionnaire. The collected data was arranged, statistical techniques and methods were used to analyze the collected data and the result was presented in tables and graphs. The study is a helping tool for government agencies, organizations and institutions to formulate a practicable framework to increase the capacity building measures of the communities and reduce the vulnerability. The map of study area is given in Figure 1.

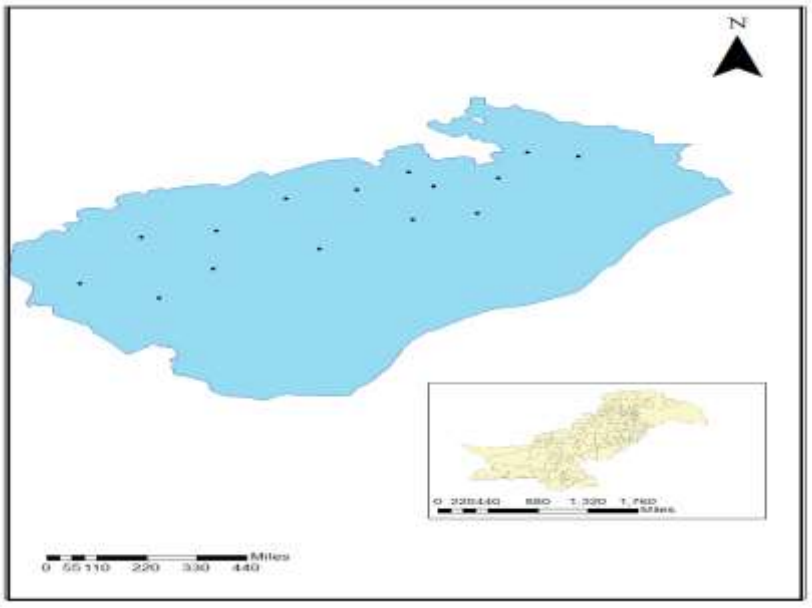

Figure 1: Location map, district Chiniot-study area.

Data tools and types, target institutions, sample size, sample selection, data analysis methods are important features in a research. They formulate the research design and are considered as the guidelines to find out the information related to a specific topic. In this research work, two data collection tools were used;

I. Interview (structured)
II. Questionnaire (closed-ended)

Primary as well as secondary data was used in this research. Primary data was collected from the officials of the institutes working for floods disaster management. In this research study, the history of different institutions and their past, present and future plans and projects for combating the effects of the floods was analyzed by collecting related data from the offices of these institutions. In this way both the primary and secondary data was collected and interpretation was exercised as per the requirement of the problem in deducing the findings accurate. All the aspects and standards of the qualitative and descriptive research designs relevant to research problem were followed and applied. Statistical description was made and for analysis and description, graphs and tables were formulated.

2.1 Survey from Institutions

A survey was conducted of the following institutes;

- National Disaster Management Authority (NDMA)
- Provincial Disaster Management authority (PDMA)
- Pakistan Meteorological Department (PDM)
- Flood Forecasting Division (FFD) Lahore

By approaching the officials of these institutes their response was known about the efforts, action plans and management of

the floods in the study area. For this purpose direct interview technique was adopted. Besides, the official websites of these institutes were visited to have an inner look about the future plan of action of these institutions to combat the effects of the floods. Relevant data was also adopted from theses institutes for a comparative analysis with that collected from the field survey about the people response about the performance of these institutes.

2.2 Survey from Public

For the purpose of evaluation of the performance and contribution of these institutes, a field survey was conducted and through questionnaire, data was collected from the flood stricken people in district Chiniot. By using sampling techniques, fifteen villages were selected as a sample from the district and through questionnaire data was collected (20 questionnaires from each village). In this way a total 300 questionnaires were got filled by the respondents.

3. RESULTS AND DISCUSSION

The institutions play a vital role in a disaster, like flood, at all stages. In the pre-flood stage, the institutes pay heed to warning, instructions, precautionary measures etc. During the flood, the role changes in providing shelter and evacuation to the affected population termed as relief stage and at the end their main focus remains in the rehabilitation of the affected people.

3.1 Pre-Flood Stage and the Institutions

The very first thing in this stage is to make the population aware of the coming disaster through warning and instructions related to flood by the authorities.

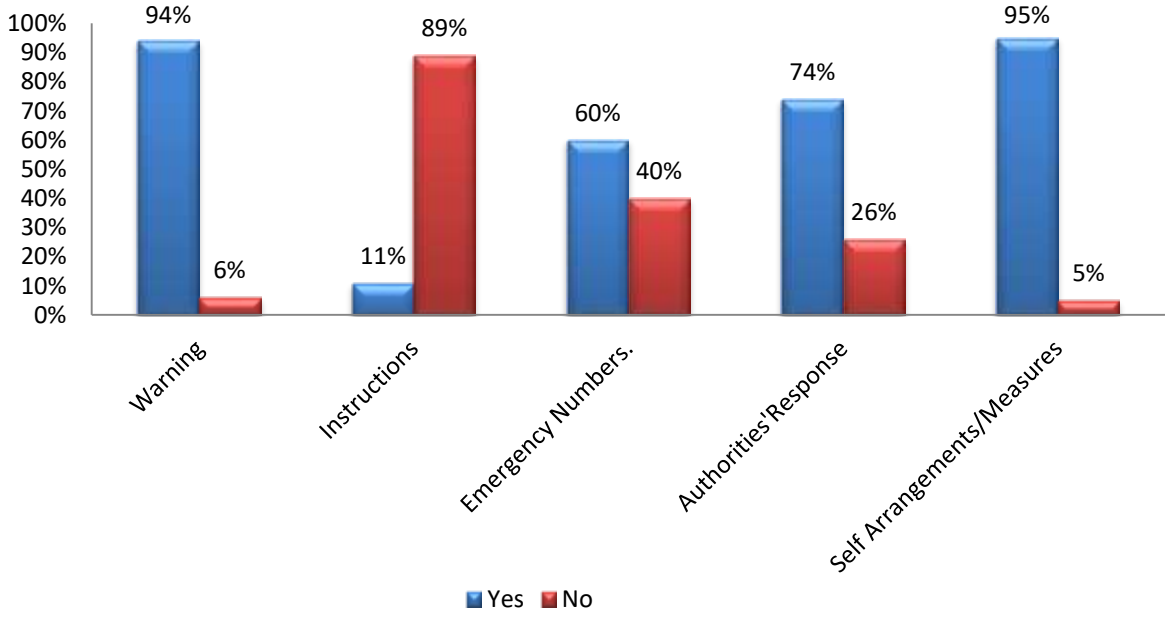

Figure: 2. Pre-flood activities by the authorities.

The figure is clearly depicting the pre-flood situation of district Chiniot. People were warned about the approaching flood and the next was to give instructions about the precautionary measures to the people so that they may get ready to cope with the approaching disaster but only 6% people responded in “yes” that they were given instructions how to cope with flood situation. This is very bad picture here depicting the negligence of the institutes of not briefing the endangered segments of the population about

the measures against the flood. The emergency numbers were announced, the said authorities also responded well when connected but the thing to think is that no solid measures were taken in time to make people safer. It is very clear from this figure that in all the surveyed parts of the district, people brought themselves forward and made necessary arrangements against the coming flood. In this regard, 95% respondents from district Chiniot took precautionary measures themselves to be safer from the flood and responsible authorities' role was very nominal in this regard.

3.2 During the Flood

In this section, the services provided by the institutes and authorities during the flood are analyzed. The role of the flood related organizations is very crucial in this phase of the disaster.

3.2.1 Evacuation and Provision of Shelter

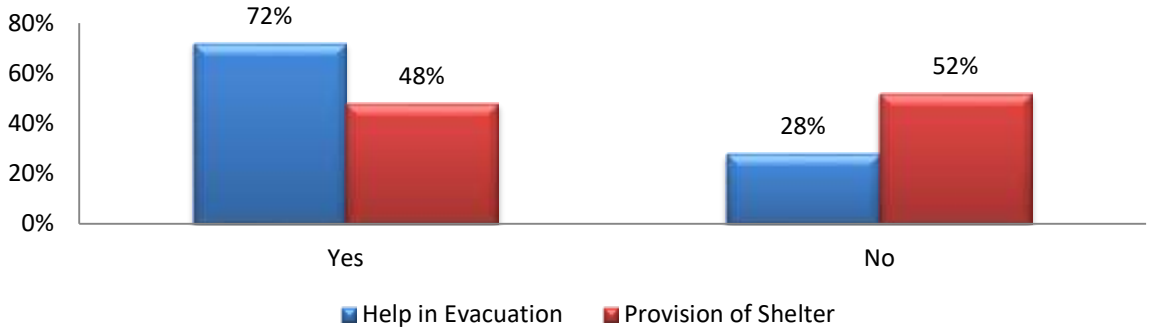

Figure: 3. Help in evacuation and provision of shelter

When there is a flood, the vulnerable people are forced to evacuate the place. The authorities and institutes are to help the people in this regard. This figure 3 clears the picture of institutes helping in the process of evacuation of the population from the flooded areas of district Chiniot to safer places. In district Chiniot, 72% were of the view that they were helped by the institutes and authorities to reach the safe places. The authorities and institutes used different sources to make people reach safer places. In this regard, boats, ships and other sources were used by different authorities

3.2.2 Provision of Shelter

Shelter here refers to the temporary camps to provide shelter to the flood affected people. Flood stricken people needed a safe place to reside though for a short period before going back to their homes.The figure 3 again shows that out of 150 respondents from district Chiniot 72, respondents replied in 'yes' which shows that a much better effort was made to make the vulnerable population safer. As described in the figure above, 48% show the availability of shelter provided by the authorities in the district Chiniot. Most of the flood affected people, got shelter in the camps installed by different authorities in nearby locations of the affected areas.

3.2.3 Helping Agents during Flood

During the flood many government departments, authorities, NGOs and institutes helped the people in one way or the other. But as the situation was so crucial, a great majority of the people remained unnoticed and unattended. The sense of community boosted them and they started helping each other.

The figure 4 below shows, many authorities and organizations who worked for the flood affected people during the flood. From the data of the, it is easily found that the most important and helping agent was local community. In all the surveyed areas, majority of the people told that the local community was the most effective as they joined the hands and started helping each other at local level. As most of the areas under study were rural and the local community was the main helping agent, instead of relying and waiting for the government authorities, the people joined hands and started helping each other. In all the villages, people worked in a group and made bunds etc. to protect and safeguard them.

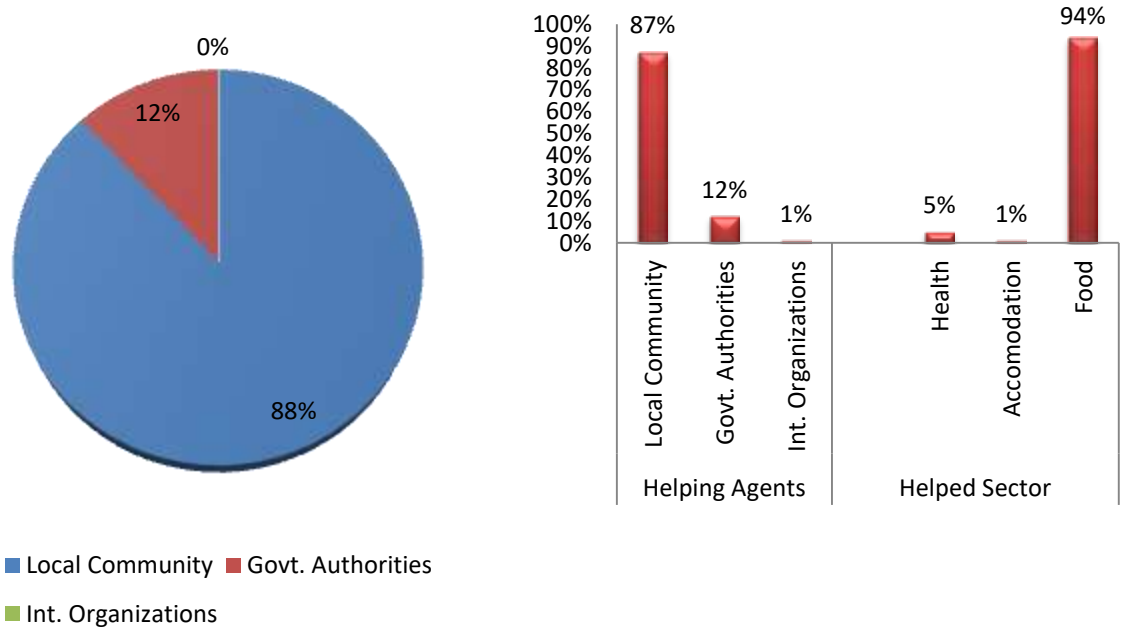

Figure 4: Helping agents and the most helped sectors.

During the flood the government authorities and institutions worked a lot for the people. In this phase the most helped and assisted sector was provision of food to the affected people. The figure above tells us the story of different fields in which the institutes and authorities worked during the flood. Food providing to the people remained at the top as it was badly needed too. Packed, baked and raw material was distributed among the flood victims. In district Chiniot, 94% informants told that food items in different forms were delivered to the victims of floods. Overall there were camps where the food was provided under the auspices of government officials while the NGOs and other charity organizers distributed food at the door step of the people.

3.3 Post Flood

It is the area where there was main focus of all the authorities and institutes enabling the affected population to restore to their actual place and status of living as they were before the flood.

3.3.1 Standing Water

The standing stagnant water was the biggest problem of the flooded areas as the drainage system was not well developed in most of the studied areas. As shown in the figure 5, in all the surveyed areas, government authorities and the institutions did nothing in helping the people to drain out the standing water from their houses, compounds and institutes like schools, colleges. The people did this job themselves. That standing water became the breeding point of mosquitoes which led to break out of diseases like malaria. In the same time the spread of dengue virus and fever was on the peak which threatened the lives of the people. In district Chiniot 97% of the respondents replied in negative on the role of authorities to help them in draining out the standing flood water.

3.3.2 Structural Measures

Permanent structures are essential to check the future floods. The structural measures such as spurs, embankments, levees, bunds etc. are as important as non-structural measures such as warning etc. both these measures are important when there is a disaster. The government seemed doing nothing in under study areas for the protection of the people as a large majority was of the view that the government was doing nothing as far as the structural measures are concerned in these areas. As deduced from the

gathered data, in all the studied areas, there was no promise of the authorities and institutes to construct any structural project to check the future floods and their impact. As shown in figure 5, in district Chiniot 100% people replied in “No” that the government has promised to construct the embankments etc. to check the floods and their out spread effects.

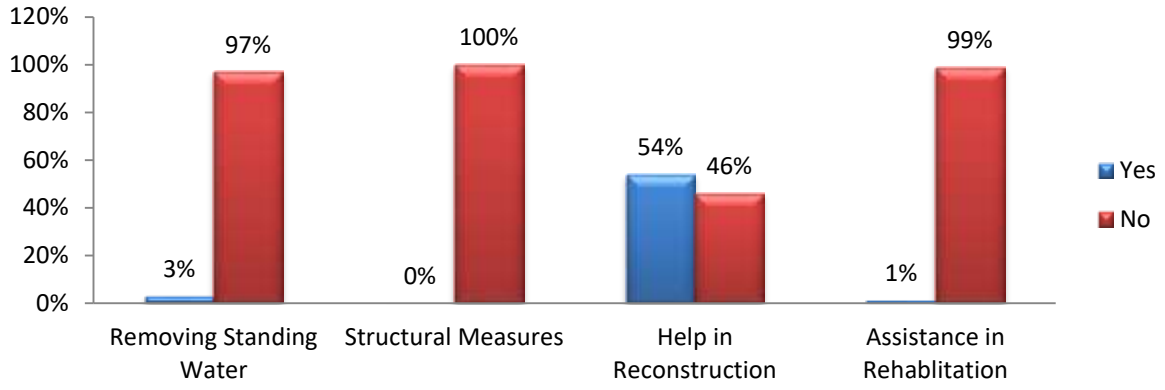

Figure 5: Post flood activities of the authorities.

3.3.3 Assistance by the Authorities

The flood stricken people needed assistance to restore to their pre-flood status. The authorities and the institutes tried their utmost in helping the people by providing assistance in different forms. The figure 5 above describes the response of the people regarding the assistance and aid given to them. In district Chiniot 54% of the surveyed affected population received the aid from the authorities. This figure over all represents the percentage of the population who received assistance either in house construction or for rehabilitation. It further explains the aid given to the affected population of the flood affected areas in all the surveyed areas to reconstruct the houses which were damaged in the flood. The figure shows that almost half of the affected population remained unpaid for compensation of their loss. The attitude of the surveyed population was very unsatisfactory about the amount they received. In agriculture sector, government authorities also paid a reasonable amount to the farmers who had lost their cropland and crops but a great majority was unsatisfied with the paid sum as that was not enough to compensate their loss.

3.4 The Most Helpful Department

Many government departments, organizations and institutes were engaged to provide help and assistance to the flood affected population in all the surveyed parts of the district Chiniot. The Revenue, Police, Health and Rescue1122 were the most significant departments which helped the people in one way or the other during and after the flood. In all the three phases of flood, pre-flood, during-flood and post-flood, one or the other department of the government was there to help the people.

The figure 6 describes the trend of the population attitude towards certain department, organization or institute which proved as the best in providing services to the affected population during the flood. In district Chiniot, the most prominent institute was Rescue 1122 with 53 % followed by the health department (43%). Other departments, revenue, police, proved less helping as shown in the figure. In all the surveyed villages, overall, Rescue 1122 was most popular and worked hard to help the people saving their lives and making arrangements for their safe arrival at the safe places.

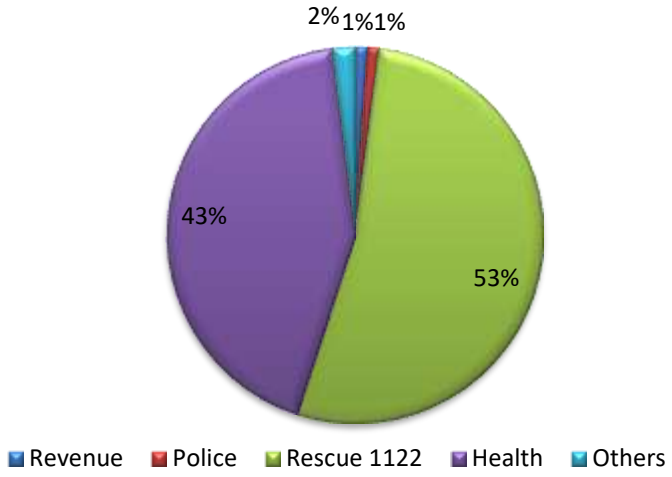

Figure 6: The authorities and departments involved in all the three phases of flood.

3.5 Satisfaction of the People

It is final analysis which describes the satisfaction level of the people for the services provided by different government organizations, departments and institutes before, during and after the flood.

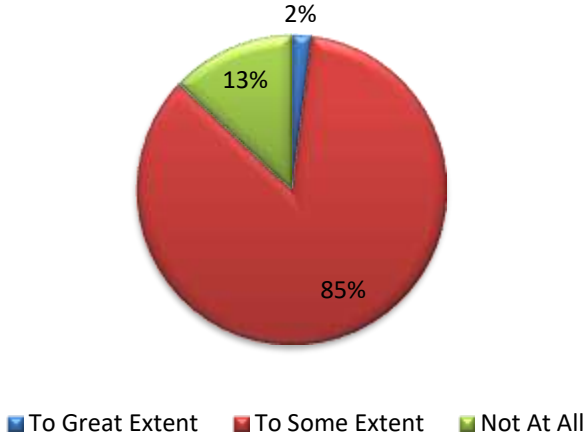

Figure: 7. Satisfaction level of people regarding performance of institutes in flood.

The figure 7 explains the overall level of satisfaction of the flood affected population for the performance of the government organizations, departments and institutes. A great majority of the people showed little satisfaction. In the study area of district Chiniot, only 2% people were greatly satisfied, 85% were satisfied to some extent while 13% were not satisfied at all. It depicts the miserable attitude and performance on the part of working authorities and departments for combating the flood effects.

4. Conclusion

Pakistan faces floods each year in mainly caused by the heavy monsoon rains accompanied by the melting of glaciers of the northern mountainous regions of the country. Punjab is the most flood-prone as it is densely populated. Punjab's geographic

location and climatic conditions make it more vulnerable to monsoon floods. Many institutes are working to combat the effects of floods at federal, provincial and local levels including National disaster Management Authority (NDMA), Provincial Disaster Management Authorities (PDMAs), Flood Forecasting Division (FFD), Pakistan Meteorological Department (PMD). Theses departments provide and share the weather related information with each other and the measures to minimize the flood effects and impact are taken both structural and non-structural across the country. Despite of all these efforts, each year thousands of people lose their lives, damage to physical infrastructure is intolerable and the economy of the country shatters badly. It clearly shows there are certain measures which we are lacking. Overall, the most affected sector was agriculture and the most helpful department was the Rescue1122 and the health department possessed second position. The level of the people satisfaction towards the authorities and institutes particularly during and after the flood was not very satisfactory as a large number of people were just satisfied to some extent. It clearly shows that there is a room for improvement and by overcoming it, the performance of these institutes and authorities can be enhanced to great extent.

References

Ali, A. (2013). Indus Basin Floods: Mechanism, Impacts and Management. Manila, Philippines: Asian Development Bank.

Cavallo, E., Galiani,I., Noy,I., & Pantano, J.(2010). Catastrophic Natural Disasters and Economic Growth. IDB working Paper Series no IDB- W-P-183.

Criscie, A., Gozzini, B., Meneguzzo, F., Pagliara, S., & Marracchi, G.(2002). Extreme Rainfall in Changing Climate: Regional Analysis and Hydrological Implications in Tuscanny. Hydrological Process, 16(1), 1261-1274.

Federal Flood Commission, FFC.(2010). Annual Flood Report 2010.Final Report. Islamabad, Pakistan: Ministry of Water and Power.

Federal Flood Commission, FFC.(2014). Annual Flood Report 2014.Final Report. Islamabad, Pakistan: Ministry of Water and Power.

Few, R., Ahem, M., Matthies, F., & Kvots, S.(2004). Flood, Health and Climate Change: A Stretagic Review. Tyndall Centre for Climate Change Research, Working Paper pop. 63.

Hong, S.W., Tao, P., & Feng, S.H.(2012). Climate Change Risk Research; A Case Study on Flood Disaster Risk in China. Advances in Climate Change Research, 3(2), 92-98.

Klemas, V.(2015).Remote Sensing of the Floods and Floods Prone Areas: An Overview. Journal of Coastal Research, 31(4), 1005-1013.

Manzoor, M., Bibi, S., Manzoor, M., & Jabeen, R.(2012). Historical Analysis of Flood Information and Impact Assessment and Associated Response in Pakistan 1947-2011. Research Journal of Environment and Earth Science, 5(3), 139-146.

Morrissey, A.S., & Resser, P.J.(2007). Natural Disasters, Climate Change and Mental Health Cosiderations for Rural Australia. Australian Journal of Rural Health, 15(1), 120-125.

National Disaster Management Authority.(2007). National Disaster Risk Management Framework, Pakistan. Islamabad, Pakistan: NDMA.

Sayers, P., Yuanyuan, L., Galloway, G., Penning, E., & Fuxin, S.(2013). Flood Risk Management: A Strategic Approach. Paris: UNESCO.

Shakoor, U., Saboor, A., Ali, J., & A.Q. Mohsin, A.Q.(2011). Impact Of Climate Change On Agriculture: Empirical Evidence From Arid Region. Pakistan Journal of Agriculture, 48(4), 327-333.

Sharif, R., Baig, N.M., Iqbal, J. & Ali, A. (2013). Implications of Environmental Considerations for Floods in Pakistan. Journal of Environmental Science, Toxicology and Food Technology, 6(1), 32-35.

The Punjab Floods. (2014). Multi-sector Initial Rapid Assessment (MIRA).

The United Nations.(1998). Guidelines for Reducing Flood Losses. Geneva, Switzerland: United Nations Office for Disaster Risk Reduction.

The World Bank. (2012). Disaster Risk Management in South Asia: A Regional Overview. Washington DC, USA: The World Bank.

The United Nations & Economic Commission for Europe, UN/ECE. (2000). Best Practice Documents. Paris, France; UN/ECE.

The United Nations.(2015). Global Assessment Report on Disaster Risk Reduction. Geneva, Switzerland: The United Nations Secretariat.

Wisner, B., Blaikie, P., Cannon, T., & Davis, I.(2003). At Risk: Natural Hazards, People's Vulnerability and disasters.

World Economic Forum. (2011). A Vision for Managing Natural Disaster Risk. Wright, M.J. (2000). The Nation's Response to Flood Disaster: A Historical Account.