

## **ANALYSIS OF SOCIO-ECONOMIC CONDITIONS AND FLOOD DAMAGE ASSESSMENT: A CASE STUDY OF 2014 FLOOD AFFECTED AREAS OF MUZAFFARGARH-PUNJAB, PAKISTAN**

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### **ABSTRACT**

In this study, district Muzaffargarh, Pakistan was chosen as the study area. The main objectives of this research are to analyze impacts of 2014 floods on the health of flood victims, damage to educational institutes, crops and loss of life stock. The study also focused on the sources of aid received by flood victims from different organizations/government. A sample of 280 respondents was taken from tehsil Muzaffargarh in south Punjab Pakistan. Five point Likert scale was used to collect the data. The questionnaire comprised of items on six variables such as the damages of houses, health, education, and agriculture, livestock and aid information from different sources during and after flood. The results of this study revealed the satisfaction level of the flood victims about six variables such as house damages, health, school buildings, livestock, and damage to standing crops, and aid from different sources for surviving during and after flooding. The study concluded that floods caused a lot of damage houses, health, education, and agriculture and livestock of flood victims.

**KEY WORDS:** damages, mitigation, flood, monsoon rainfall, hazards, vulnerability

### **INTRODUCTION**

Approximately 75 percentages of the residents of the biosphere victimized by way of some climatic vulnerabilities almost one time in their life named as floods, droughts, heavy monsoon as well as tropical cyclones. According to the DFO (Dartmouth flood observatory) record based on global studies, virtually 427 huge flood occasions arrived during June 1985 and December 2013 in South Asia (India, Pakistan, Bangladesh, Nepal and Sri Lanka)[2]. Flooding can be generally categorized into physical, such as climatological powers regarded as natural arrival of flood and sometime by man-made efforts for- example clearness of flora and urbanization. The most common sources of floods are climate change, most remarkably monsoon season. Prolonged monsoon regarded as the most happening reason of flooding globally. This period usually continues to several days, weeks or months of nonstop rainfall. Pakistan is one of the five subcontinent's countries with the most dreadful number of people victimized to floods, which happen frequently because of hefty storms which start from Bay of Bengal and hit as the rainstorm from July to September [4]. The mountain spreads in the north of Pakistan (the Himalayan range) provide ceaseless source of water-flow into the brooks. Pakistan has 79 meteorological stations located in

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many cities but still many of them are lack of screening the integration of forecast and operation of respectively arrival of flooding phenomena every year.

The last decade the climate change has been a rising subject. Maximum studies accept on the climate change being veracity, but the estimations about the brutality and the projection on the upcoming climate always fluctuates. Some queries project that climatic actions such as heavy precipitation will happen more frequently in the future although other studies figures that measured precipitation sequences do not agree to an increased rate of precipitation [6] [7]. A British study not only agrees on extreme rainfall frequently, but also sorts an important report that the vulnerability for extreme rain experiences before now today.

The arrival of flooding events in the subdivision is universal but Pakistan in certain ensures extensively enlarged from ancient several years, due to global warming plus quick temperature variation. Because of this Pakistan chanced repeated flood occasions since the last six years viz. 2010, 2011, 2012, 2013, 2014 & 2015, this directs the flood at present time became a yearly phenomena in the territory. This is worsened through scanty shallow rainwater storage ability for fascinating flood, prolonged and growing risk for intrusions in flooding lands, insufficient release capacity of Dams and water Links, insufficient costs sharing underneath PSDP and Provincial ADP in implementation of inundation missions, frail in inundation emplacements because of improper protections also significantly imprecise regular syphon setup. Capability shortages happen mutually on regional and local ranks. Here, absence of active direction between organizations tangled in flood controlling, initiated in territory by restrictions in mechanical dimensions like propagation in primary cautioning, calamity responsiveness methods, alternative reaction plus operational events for inundation modification. The native public have no adequate catastrophe awareness, evidence as well as there is scarcity of common attention hovering, in addition the training for the multitude soften exaggerated through inundations, aiming exclusively to inhabitants living inside the dynamic inundation settlements nearby the main and further minor tributaries. The inundations in 2014, eliminated the cultivated land approximately 2.415 million acres (9,779 square kilometers) disturbing 4,065 hamlets, sured almost 367 lives, flatteringly injurious 107,102 families as well as residents approximately 2.600 million worried. In the light of IRSA research, regularly in a year, surface water accessibility starting to Western in addition to Eastern Rivers is 144.57 MAF. The Western Rivers has 138.03MAF and on other hand, Eastern Rivers has 6.54MAF. However, the extreme arrival of floods verified 183.45 MAF annually through 1978-79 besides there is least flooding (99.05 MAF)

annually through 2001-02 for the duration of the post Tarbela epoch since 1976-77 to 2014-15. The Regional consumption was 97.05 MAF, Structure damages remained 18.22 MAF as well as ejection of down watercourse Kotri Barrage existed 29.30 MAF [9]. The native coping approaches aimed at dealing tragedies are frequently moved since one ethnic group to succeeding ethnic group contained by cluster of people as well as family. People believe in this hypothesis that disasters keep an eye on the equal array plus alike training is prerequisite and drive as enough for parallel occurrence. Although, coping approaches is the theme for modification all the time for the reason, which of contradictory existing circumstances as well as criteria that commonly proceeds to unlike aptitudes of affected individuals to react expected calamity.

Climatic deviations are the key towards increasing of the level of the sea and severe meteorological disorders in the outcome of global warming and implications directed for urban sprawls in developing countries are significant dynamics of flood calamity. The ratio will take the jump high by up-coming 50 years. Flooding is always constant and broad climatic threat which is approximately 40% for adversities universally.

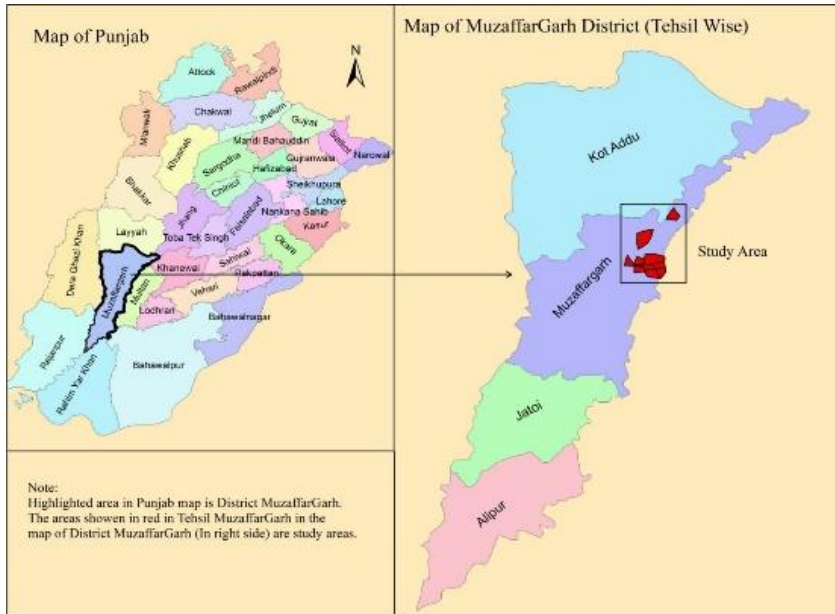
Maximum precipitation in higher Punjab, Azad and Jammu Kashmir has activated torrents in the watercourses Chenab, Jhelum, Ravi and Sutlej. The flood-prone regions are Sialkot, Narowal, Gujrat, Gujramwala, Mandi Bahauddin, Hafizabad, Chiniot and Jhang. Likewise, India has discharged 818,000 cusec of water in Chenab that triggered by extraordinarily deluge in River Chenab which had pour a lot of water into Head Marla and Head Khanki also spread to south Punjab through Head Trimmu and Head Punjnad in future as well as arrive after in province Sindh. Flood cautions have been delivered by Multan, Muzaffargarh, Lodhran, RahimYar Khan and Bahawalpur directors besides numerous campsites have been proven by means of district governments next to several great threat zones in affected localities sideways by the banks of water tributaries on Chenab and Sutlej. Residents existing in low region and nearby the river belts have been exiled to escape from fatalities.

Considering the percentages of vulnerability by the character of flood, no inclusive research has been given of this area. This impression has been intended to categorize percentage of people which are unshielded to floods and how they mitigate this climatic vulnerability. Especially by the 2014 flood, some rural areas of tehsil Muzaffargarh, in the province of southern Punjab are studied.

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## STUDY AREA

Damages during and after flooding from eight areas (Mouza Lalpur, Rungpur, Bhuttapur, ChakRohari, Taliri, Doaba, Khan Pur Baga shair, Sunnaki) of Tehsil Muzaffargarh.

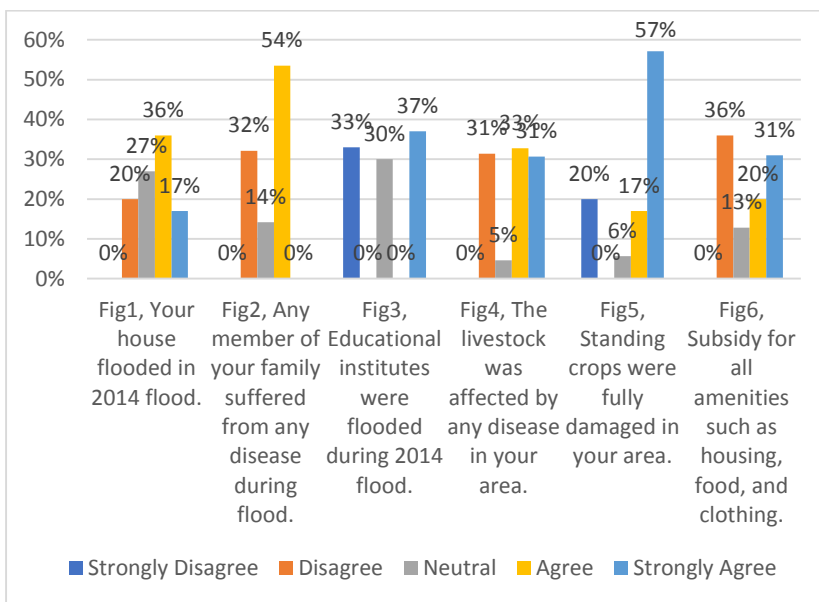


**Figure 1:** Study area

## MATERIAL AND METHODS

This study is completely based on primary source of data. In this research, households were carefully chosen in search of numbers of affected people and the other damages during and after flooding from eight areas. Number of Societies who faced up flood each year were chosen as respondent. The data was collected and interviewed only by family head of selected households about their damages of houses, the impacts on health, the impact on education, loss in agriculture and livestock and aid provision to deal with flooding. Simple random sampling procedure was used to gather the information of 280 households from eight areas. The questionnaire was based on Likert scale. In each area, 280 questionnaires were divided into 35 questionnaires and dully filled by researcher. The questionnaire was composed of only 6 questions as variables. All variables were done by tally method, after that, the collected data was fed into computer. The data was treated into Microsoft Excel 2016 for constructing the graphs, tabulation and data sheets.

## DATA ANALYSIS AND INTERPRETATION



## RESULTS and DISCUSSION

**FIG 1**, For above diagram corroborations for relevant question reveals as 0% people as STRONGLY DISAGREE, 20% inhabitants based on DISAGREE, 27% people as NEUTRAL, 36% populaces rely on AGREE and 17% remain STRONGLY AGREE. **FIG 2**, For above graph significant question approves 0% citizen responses as STRONGLY DISAGREE, 32% occupants count on DISAGREE, 14% people remain as NEUTRAL, 54% inhabitants stand as AGREE and 0% STRONGLY AGREE. **FIG 3**, In this graph, the relevant question shows that 33% respondent are STRONGLY DISAGREE, 0% respondents are DISAGREE, 30% respondents are NEUTRAL, 0% respondents are AGREE and 37% are STRONGLY AGREE. **FIG 4**, For this graph consequences of relevant question favors that 0% people as STRONGLY DISAGREE, 31% inhabitants rely on DISAGREE, 5% person depend on NEUTRAL, 33% defendants claim to AGREE and 31% remain STRONGLY AGREE. **FIG 5**, Above this chart, confirmations for suitable question 20% people rely on STRONGLY DISAGREE, 0% DISAGREE, 6% citizen standpoint as NEUTRAL, 17% respondents remain AGREE and 57% are STRONGLY AGREE. **FIG 6**, This graph illustrates that 0% defendants are STRONGLY DISAGREE, 36% are DISAGREE, 13% are NEUTRAL, 20% are AGREE and 0% are STRONGLY AGREE.

The results of 6 variables given collectively such as house damages, impacts on health, and damages of school infrastructure, full loss of

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livestock and full loss of agricultural lands as well as aid for clothing, food and shelter from different sources are followed.

Because of climatic modifications like monsoon pattern, rainfall amount, temperature variation etc but the percentage and numbers of flood incidence which is growing time to time throughout the world surrounded by further natural hazards. Most of people told that they could not leave their houses because of affection but they were forced to leave by flooding. Mostly inhabitants were lived near banks of river way and it was told by them that whenever the river Chenab got overflowed their houses and other necessities got damaged. The study area was selected nearby the water channel of the river Chenab.

The happening of a flood occasion customarily bring about a reaction to relieve injuries as well as arrival values for instance hastily as probable as before calamity settings. This is occasional discovery long-term tactical forecasting deliberate to alleviate the various aspects of the deluge vulnerability. On the whole, it performs that identical scarce methodical climatic impression valuation make sure conceded on view casing all ecological phases of a solo flood measures. On the other hand, in the negotiation of water as well as sewage structures plus environmental controls of enlargement go on commonly discounted. By portion of progression, this is for the reason that floods are frequently low- possibility procedures which sort not out the flourishing exceedingly in the midst of the numerous disputes that societies bears on a habitual beginning. In calculation, numerous humanities obligate executed crisis deed procedures to support the abrupt aid of flood casualties that inclines to effort in contrast to the enhancement of wide-ranging tragedy arrangement. Moreover, it had better exist distinguished that nearly dealings remain moderately capricious, not less than in era uncertainty in space, hence conceding operative preparation despite the fact sponsoring a humble retort style. Conversely, in spite of these physiognomies, the prospects aimed at estimating feasible controls of a specified occurrence as well as the forecasting consequently remain substantial.

The floodwater overwhelmed many places and carried on intense damages to agricultural land irrigation system, infrastructure sanitations, and environment as well as human lives [15].

Climatic deviations which is key towards increasing of the level of the sea and severe meteorological disorders in the outcome of global warming and implications directed for urban sprawls in developing countries are significant dynamics of flood calamity. The ratio will take the jump high by up-coming 50 years.

United nation's Intergovernmental Panel on Climate Change reported, globally estimation of the mean temperature has augmented

approximately 0.3 towards 0.6 degree Celsius since before 19th era to the present-day, plus a rise of 0.2 to 0.3 degree above the preceding 40 years. An important temperature growth can generate numerous climatic actions, like melting of glaciers, the loss of substantial aquatic flora and fauna included further kingdom of life, in addition the influences on cultivation also anthropological fitness.

Many affected people were not standing for flooding plus impacts because of love with their inherent city, sluggishness to keep money for other dedications in spite of torrent attentiveness. Brouwer *et al.*, 2006 in his readings piloted at Bangladesh, decided that least equipped residents to inundating bears the premier jeopardies mutually the domestic level and public level.

**Table1:** Response to questions related to flood

Sr. No.	Questions	Fr. Strongly Disagree (%)	Fr. Disagree (%)	Fr. Neutral (%)	Fr. Agree (%)	Fr. Strongly Agree (%)
1	Your house flooded in 2014 flood.	--	56 (20)	76 (27.1)	100 (35.7)	48 (17.1)
2	Any member of your family suffered from any disease during flood.	--	90 (32.1)	40 (14.3)	150 (53.6)	--
3	Educational institutes were flooded during 2014 flood.	91 (32.5)	--	84 (30)	--	105 (37.5)
4	The livestock was affected by any disease in your area.	88 (31.4)	--	14 (5)	92 (32.9)	86 (30.7)
5	Standing crops were fully	56 (20)	--	16 (5.7)	48 (17.1)	160 (57.1)

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	damaged in your area.					
6	Subsidy provided for all amenities such as housing, food, and clothing.	--	188 (67.1)	36 (12.9)	56 (20)	--

### Data Analysis

Data were entered in MS Excel Spreadsheets for analyses using SPSS version 20. Chi-Square test of associations was used to compare association between different variables.  $P$ -value  $\leq 0.05$  was used to check statistical significance of the results.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	56	20.0	20.0	20.0
	Neutral	76	27.1	27.1	47.1
	Agree	100	35.7	35.7	82.9
	Strongly Agree	48	17.1	17.1	100.0
	Total	280	100.0	100.0	

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	90	32.1	32.1	32.1
	Neutral	40	14.3	14.3	46.4
	Agree	150	53.6	53.6	100.0



	Total	280	100.0	100.0	
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**Table 4:** Educational institutes were flooded during 2014 flood

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	91	32.5	32.5	32.5
	Neutral	84	30.0	30.0	62.5
	Strongly Agree	105	37.5	37.5	100.0
	Total	280	100.0	100.0	

**Table 5:** The livestock was affected by any disease in your area

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	88	31.4	31.4	31.4
	Neutral	14	5.0	5.0	36.4
	Agree	92	32.9	32.9	69.3
	Strongly Agree	86	30.7	30.7	100.0
	Total	280	100.0	100.0	

**Table 6:** Standing crops were fully damaged in your area

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	56	20.0	20.0	20.0
	Neutral	16	5.7	5.7	25.7
	Agree	48	17.1	17.1	42.9
	Strongly Agree	160	57.1	57.1	100.0
	Total	280	100.0	100.0	

**Table 7:** Subsidy provided for all amenities such as housing, food, and clothing

		Frequency	Percent	Valid Percent	Cumulative Percent
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Valid	Disagree	188	67.1	67.1	67.1
	Neutral	36	12.9	12.9	80.0
	Agree	56	20.0	20.0	100.0
	Total	280	100.0	100.0	

**Hypothesis Test Summary**

	Null Hypothesis	Test	Sig.	Decision
1	The categories of Q1 occur with equal probabilities.	One-Sample Chi-Square Test	.000	Reject the null hypothesis.
2	The categories of Q2 occur with equal probabilities.	One-Sample Chi-Square Test	.000	Reject the null hypothesis.
3	The categories of Q3 occur with equal probabilities.	One-Sample Chi-Square Test	.294	Retain the null hypothesis.
4	The categories of Q4 occur with equal probabilities.	One-Sample Chi-Square Test	.000	Reject the null hypothesis.
5	The categories of Q5 occur with equal probabilities.	One-Sample Chi-Square Test	.000	Reject the null hypothesis.
6	The categories of Q6 occur with equal probabilities.	One-Sample Chi-Square Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

## CONCLUSION

Like other South Asian countries, Pakistan is frail in front of natural hazards in which primarily earthquakes, floods and droughts are responsible. The flood 2014 in the Chenab River caused unbelievable damages to houses, irrigation, drainage, human lives etc. Flood is the most prevailing force on Lithosphere with the grimmest influences. Globally, human lived and died under the inundations from the very beginning. Since life exists on earth, flood originated the prominent stories within the world history. In tehsil Muzaffargarh flood, 2014 has several adverse effects on People Health, Education, Livestock and Agriculture etc.

The inundations in 2014, eliminated the cultivated land approximately 2.415 million acres (9,779 square kilometers) disturbing 4,065 hamlets, sured almost 367 lives, flatteringly injurious 107,102 families as well as residents approximately 2.600 million worried. In 2015 beyond 1.933

million residents traumatized, 4,634 settlements (destructive 10,716 communities) as well as claiming nearly 238 survives above entire country.

This study concluded as there are significant response of inhabitants of nominated areas. This is clear that people of Tehsil Muzaffargarh has suffered from antagonistic flooding situations. In this study, nearly 50% people are dislocated from their houses and not fully located back to their houses early. Upto 50% people became sick during flooding. Upto 35% educational buildings got damaged. Above 60% livestock suffered from some diseases. Upto 70% standing crops swept away by flooding. Nearly 36% of people did not provide any aid from district or provisional governments/organizations.

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## ANNEXURE

### Questionnaire

QUESTIONS	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
1. Your house flooded in 2014 flood.	1	2	3	4	5
2. Any member of your family suffered from any disease during flood.	1	2	3	4	5
3. Educational institutes were flooded during 2014 flood.	1	2	3	4	5
4. The livestock was affected by any disease in your area.	1	2	3	4	5
5. Standing crops were fully damaged in your area.	1	2	3	4	5
6. Subsidy provided for all amenities such as housing, food, and clothing.	1	2	3	4	5

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**Number of respondent**

QUESTIONS	STRONG LY DISAGRE E	DISAGR EE	NEUTR AL	AGRE E	STRONG LY AGREE
1. Your house flooded in 2014 flood.	0	56	76	100	48
2. Any member of your family suffered from any disease during flood.	0	90	40	150	0
3. Educational institutes were flooded during 2014 flood.	91	0	84	0	105
4. The livestock was affected by any disease in your area.	0	88	14	92	86
5. Standing crops were fully damaged in your area.	56	0	16	48	160
6. Subsidy provided for all amenities such as housing, food, and clothing.	0	188	36	56	0

<b>Statistics</b>							
		Q1	Q2	Q3	Q4	Q5	Q6
N	Valid	280	280	280	280	280	280
	Missing	0	0	0	0	0	0
Percentiles	25	3.0000	2.0000	1.0000	2.0000	3.0000	2.0000
	50	4.0000	4.0000	3.0000	4.0000	5.0000	2.0000
	75	4.0000	4.0000	5.0000	5.0000	5.0000	3.0000