IMPACT OF POST TRAUMATIC STRESS DISORDER (PTSD) ON THE VULNERABLE GROUPS OF NOWSHERA FLOODS 2010, KHYBER PAKHTUNKHAW, PAKISTAN

By

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A thesis submitted in partial fulfillment of the requirements for the Degree of Master of Science in Disaster Management

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This is to certify that the

Thesis titled

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in

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ACADEMIC THESIS: DECLARATION OF AUTHORSHIP

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"*Impact of Post Traumatic Stress Disorder (PTSD) on the Vulnerable Groups of Nowshera Floods 2010, Khyber Pakhtunkhaw, Pakistan*"

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DEDICATION

I dedicate my work, the reward of my labor, thoughts and study to my affectionate Imam, ***Hazrat Muhammad Mahadi, Elliehissalam Ajjal-al-Allah o Ta'ala Farajahusharif*** and his pious companions; and also to all those victims who lost their lives, limbs and their entire household in the devastating floods of Nowshera in 2010, to all those who are still suffering with mental stresses and then to all those emergency workers whom I saw putting their precious lives in danger in rescuing the affectees while also not forgetting the Armed Forces personnel who played their sacrificial role in managing such a devastation; effectively, adequately, efficiently and skillfully.

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ABBREVIATIONS

1. ANOVA……Analysis of Variance
2. ARI ……...Acute Respiratory Infections
3. AFIRM……..Armed Forces Institute of Rehabilitation Medicines
4. AB……..…….Avoidance Behavior
5. CMH ……..…….Combined Military Hospital
6. CB Hosp……...…….. Cantonment Board Hospital
7. DEM…….…….Digital Elevation Model
8. DHQ……..…District Headquarters
9. DCO…….…….District Coordination Officer
10. DPO……..……District Police Officer
11. DDMO……...……..District Disaster Management Officer
12. DDMU……..District Disaster Management Unit
13. DDMA…….District Disaster Management Authority
14. EQ……Earth Quake
15. ERE……..……Event Re-Experiencing
16. FRM…….…..Flood Risk Management
17. GN……..….General Numbness
18. GIS……..…….……..Geographic Information System
19. GPS…….Global Positioning System
20. GT sheets…….……General Topographic sheets
21. Hyper……..Hypersensitivity
22. IDPs …….Internally Displaced Persons
23. NDM ACT…….…National Disaster Management Act
24. NDMO……...……..…National Disaster Management Ordinance
25. NDMA……..…….. National Disaster Management Authority
26. NIDM……..….. National Institute of Disaster Management
27. POWs …….……Prisoners of War
28. PTSD ……...……Post Traumatic Stress Disorder

29. PDMA ……..Provincial Disaster Management Authority
30. p.a…….……per annum
31. KPK. …….Khyber Pakhtun Khaw
32. RTA…….……..……Road Traffic Accident
33. UK…….……..United Kingdom
34. MS HoD, Dept……..……Master Surgeon , Head of Department
35. MS …….…….Marital Status
36. RS……Remote Sensing
37. RF……Representative Fraction
38. Sq Km…….……..Square Kilometer
39. SPSS…….Statistical Package for Social Sciences
40. US…….……United States
41. VCA……..Vulnerability Capacity Assessment
42. Vuln…….…….Vulnerability
43. WHO……..World Health Organization

ANNEXURES

ABSTRACT

Stipulation of mental health typically arising from some scary confrontation that might be the straight forward experience or a direct evidence of an incident is commonly known as Post Traumatic Stress Disorder (PTSD). Uninhibited judgments, reminders, frightening dreams and callous fretfulness concerning a drastic incident or a situation are its principal indicators; Mayo Clinic (2013). With the technological provisions, it can be regarded as a psychosomatic response stirring after an extremely nerve-racking experience such as a natural disaster, physical violence, or wartime. It is in fact a mental condition in the face of an innate or a manmade disaster; usually characterized by depression and/or anxiety; Learner's et al; (1980). Though very little has been endeavored in the quest of identifying such provisions which tackle the interrelationships of PTSD concerns; yet the psycho-stress of natural disasters is still an emerging apprehension of human health at international level and Pakistan too is faced with such challenges. Affected communities as well as the vulnerable groups are constantly under substantial social and psychological stress posed by the risk of tornadoes, flooding, earthquakes, droughts and cyclones etc.

Among all, the effects of poor human social, physical, emotional and cultural wellbeing is stringent upon the adverse effects of flooding because it is extensive and complex due to drowning, injuries, deaths and volatile incidences of everlasting unseen emotional and mental disorders, especially in the post flood scenarios. Flood PTSD gets even more compounded in poor and developing nations because of their intense socioeconomic vulnerability vis a vis an extremely limited capacity to cope with; which takes years and decades to recuperate; provided no follow up flood occurs. Therefore, it is of paramount significance to examine the impacts of PTSD on the vulnerable groups due to flooding with particular context of Nowshera Floods 2010 Pakistan; where the resources are already scarce and feeble.

Chapter - 1

INTRODUCTION

1.1 Background; Focus of Study

Post Traumatic Stress Disorder (PTSD) may charade usually as an incapacitating sickness among most of the world population. It may not only hold back a person's routine activities of life but also gravely and unruly upset the recital presentation of events in totality. An execution plane of PTSD differs from one character to another depending upon the intensity of its defacement concerning the vulnerability of fatalities may it be social, societal, economic or any other. Awareness about PTSD is highly inadequate because general population is barely edified concerning this somber issue; the planet is anguished now a days. Onset of PTSD takes effect usually after a traumatic episode carrying any of its prospective risks; it entails. PTSD pretentious entity may not flaunt symptoms fairly enthusiastically rather conserves the same for quite some time. For an illustration, a prospect subjected to a natural disaster is likely to become an aspirant of PTSD across a series of shocking trials or just a trial, yet the possibility may exist that a little veiled trauma(s) or few other unknown sorts of psychosocial hurts are not predicted quite readily. In such a circumstance, PTSD may not be measured at all. Four focal points are auxiliary to the mechanism of PTSD. First one is "Hypersensitivity" i.e. aversion or antipathy, second is "Event Re-Experiencing" i.e. experiencing a recurrent episode, third is "Avoidance Behavior" i.e. evading a traumatic situation and the last one is "General Numbness" i.e. lack of feeling. Principally, these fragments are usually likely to subsist with each other because these are directly proportionate to protract the continuation of PTSD largely. Because of hidden nature of PTSD, it might be very common that any survivor might not be representative of either one or all crucial points contributing to PTSD rather he/she will still be a prospective transporter of this strange ailment, especially when hit by the adverse impacts of any disaster(s).

Though, the whole Pakistani nation is faced with increased volume of earthquakes, terrorism, floods and other disasters with each passing year; yet it is very

difficult to study the impacts of entire range of post traumatic stresses in one go. That's why; flooding is chosen being the complex one, most disastrous, frequently occurring phenomena, where the post traumatic adaptation can be readily studied and made effectively manageable. Therefore, an effort has been made to delve into an inventive; and an assorted setting of flooding chore where the agonizing sprawl of PTSD has brunt behind the vulnerable groups of Nowshera Floods 2010, Khyber Pakhtunkhaw (KPK), Pakistan.

1.2 Research Context

Various studies have suggested that evidence of PTSD remains in the victims for several months and years after the occurrence of natural disasters. These continue to increase under constant repetition of disasters; if kept unaddressed. PTSD was observed among the victims at the rate of 4.5%; ninety days after the Ano Liosia EQ (Earthquake), Greece; 1999 Roussos A, Goenjian AK et al (2005), 5% after three months of Hugo Hurricane , Shannon MP, Lonigan CJ, Finch AJ and Taylor CM (1994), 3% and 9% respectively among males and females following Hurricane Andrew; Garrison CZ, Bryant ES et al (1995), 26.9 % post Super Cyclone Orissa, India; Kar N, Bastia BK (2006) and 28.6 % mild to moderate PTSD after Northridge EQ; Asarnow J, Glynn S and Pynoos RS (1999). Further studies have suggested even more percentages of PTSD symtomology in natural disasters when more time is elapsed e.g. there had been an increase of up to 70% moderate to severe PTSD twenty one months following the Hurricane Andrew; Shaw JA, Applegate B and Schorr C (1996), 37% after two years of Buffallow Creek Dam Collapse, Green BL, Korol M et al (1991) and 22.2 % after 3.5 years of Marmara EQ, Turkey; Karakaya I, Agaoglu B, Coskun A, Sismanlar SG and Yildiz (2004). Geographic setting of Pakistan displays that it is the land of major six rivers with so many tributaries culminating at the Panjnad in the south before falling into Arabian Sea encompassing the world's largest canal network and a hydrological system with numerous head-works, dams and reservoirs (Map 1.1). Lay of the land is from North East to South West having Himalaya Mountains in the North, Suleiman Range towards North/North East and Lower Punjab and Sindh Plains towards South/South West.

Map 1.2. Pakistan's River System (Friedman: 2008)

From the earthquakes point of view, Pakistan is located at the junction point of World's most famous tectonic plates i.e. Arabian Plate, Indian Plate, Australian Plate, Eurasian and Tibbitian Plates. At the same very point, her geostrategic location is the focal point for the hegamonistic designs of existing and promising polarities baring aside the hostile eastern neighbor. With this diverse geographic as well as geostrategic pattern, Pakistan being the speedily developing country; is faced with multiple disaster challenges such as floods (of all types and everywhere), landslides, glacial lake outbursts, mud flows, industrial accidents, earthquakes, terrorism and conventional warfare. A huge list of multiple and repeating challenges, especially during the past few years is putting her population through a continuous trauma and stress with discredits of pounding socio-economic vulnerabilities. Therefore, there is dire need to study the post traumatic stress disorders occurring on our nation for which are we not only ignorant but also devoid of its management strategies. It is usually observed in the repercussion of a tragedy that there are some of the post disaster effects too that the survivors persist e.g. their displacement, anxiety disorders, earning lost, corporal and poignant pain as well as pecuniary pasting. The people are changed by PTSD physical pain characterized by the racing heartbeat, dying fear, feeling of needles and pins in the body parts, chocking pain in the chest, feeling of sudden chills and hot flushes, body quivering, imbalance,

excessive sweating of hands, foot tremor, feeling of queasiness and/or wooziness, paralysis attack of terror and difficulty in breathing etc.

1.3 Objectives of Research

Following objectives are perceived in current cram:-

i. To identify hazard / vulnerability areas of Nowshera District in relation to Floods 2010 and later.

ii. To study the impact of PTSD on the Vulnerable Groups and draw comparison on the past study (if any).

iii. To suggest the remedial measures, based on the data obtained.

1.4 Scope and Significance of Study

Both the innate and non-innate disaster categories differ broadly because of their scenery and an extent of strain these sustain depending upon the social, physical, economic, cultural and emotional vulnerabilities versus the accessibility of psychosocial prop up which the victim population expects.

It is the eighth successive year past the Floods 2010 in Pakistan that huge land masses of the country are being inundated in flood horizontal plane. Alongside, each passing year, the management fails to adopt adequate preventive as well as precautionary dealings. Focal point at the end of any flood is the conduct of relief operations besides carrying out the financial recompense as well as provision of rehab services but the "*Psychosomatic Ordeal"* is that vital aspect which is usually overlooked by the management as well as emergency workers. A causative feature with regards to Indus River is that it has not any aboriginal and an appropriate hydrological network up and down stream for its own water resource management less Terbella Reservoir and Ghazibrotha Hydal Power Project but also those waters which it receives from Kabul and Swat Rivers (from KPK) as well as form Jhelum, Chenab, Ravi and Sutlej Rivers (from Punjab), which substantially damage the country physically, socially and psychologically during the peak flood season.

Flooding event dwells in a range of enormities, which affect the discernment of the people in such traditions that everyone cannot understand. Floods occurring in Pakistan have now turned out to be a source of steady stressor because sagacity of fickleness and irrepressible feelings exists among those affected. This situation is becoming more rigorous; one can neither predict nor manage the effects of natural calamity through the quantitative measures. That's why it is of paramount importance to formulate a comprehensive and responsive environment post a disaster, especially when national interests are at stake. One of the major factor for selecting Nowshera District as study content is that the population clusters here are only affected by floods repeatedly and other contributory factors tangent upon PTSD are of least concern i.e. earthquakes (none), landslides (none) and terrorism (not directly affecting but a little fall out). Lastly, the cumulative effect of flooding in Swat, Kabul and Indus Rivers take place on the population of this area every year, especially during monsoon.

1.5 Organization of Thesis

For easy assimilation and flow of ideas, fair contextualization, smooth research transition, and to put forth logical conclusions/summary of results following the practicable recommendations, this document has been sub divided into five chapters.

1.6 Advantages of Study

Researches carried out in the past e.g. by Gibbs, (1989, 1991); Green & Solomon, (1995); Katz, Pellegrino, Pandya, NG & De-List, (2002) and Sun-din & Horowitz, (2003) claim that effects of a disaster are more profound and subtle after its occurrence. Population residing in the flood inundated regions of Pakistan is the big fatality since 2010. They have become an exemplar carrier of already existing but a hidden mental trauma i.e. the folks who happen to be ill with psychosomatic disarrays are considered additionally vulnerable to an augmented anguish while assessing the repercussion of a catastrophe thereby fostering the probability of post traumatic stress disorders among them. Later the whole society seems getting paralyzed slowly and gradually.

Constant amplification in dreadfulness and emotional deficit attributed by floods each year, tell us that a “Methodical Intrusion Arrangement” would essentially be

required alongside a well-organized “Water Containment Strategy”. An efficient and achievable catastrophic bargain must be primed and scampered to grant wellbeing of general populace whilst also suffocating hassle entirely from surroundings. It is a crucial deterrence which ascertains a great deal to disaster preparedness, thus directly placing psychology in the chain of crisis management and disaster wakefulness..

1.7 Areas of Application

It is imperative for the establishment to puddle up the means together with the psychologists and psychiatrists available across the nation in order to formulate an intrusion plan with a primary purpose of deliberating on handling the emotional concerns of the victims, mustering their social hold up, devising coping apparatus for them and last but not the least; poster tightly on the communicable diseases attacking their health adversely.

A parallel approach must also be recognized for identifying the communities at risk and then prevailing to lend a hand in their disaster management struggle. This type of avoidance is also acknowledged as “*Crisis Intervention”*, e.g. an attempt is made to shed off the stress whenever any messy state is at advantage. This intervention may turn out to be a game changer unless psychological backing is adequately provided to cope up their aptitude to fight out the disaster quite well.

1.8 Study Limitations

i. Since the canvas of complex nature of disasters in Pakistan is very large and it’s beyond the scope of this study to take along all the disasters or even the floods all over Pakistan.

ii. The study focus is limited only to investigate the impacts of PTSD on the vulnerable groups of floods over a specific area as a model i.e. Nowshera Floods 2010, Khyber Pakhtunkhaw, Pakistan.

iii. Among other areas affected by the floods 2010, District Charsadda, Mardan and Peshawar have been omitted; being the outliers.

Chapter-2

REVIEW OF LITERATURE

2.1 Introduction

"Whenever somebody shouted and raised her name, she always cowered in a corner of the house. She would always set off with depression when watching TV and hear commentators discussing and debating about drowning of houses and people in storms of flood. Her heart beat would pound and increase the alertness level to relieve her trauma but at the end with fear; she would always paralyze." Years had passed but her body nerves were conditioned to suppose that shouting leads to drowning.

"A prospect was interviewed; just 21 years old guy; he was telling about the nightmares; he was scarred. He was from South Waziristan and couldn't live in his beloved village anymore. He had to leave, went to Bannu and then reached Nowshera with his brother. Still the nightmares didn't leave him. He wept always and not happy here in the city because it was not home. He cannot sleep at night; he hasn't slept since last seven years. He can't properly concentrate when selling corn on the cart. He still hears the drone attacking his house turning into rubble in seconds; killing everyone."

"They all lived in Balakot. Ground was shaking beneath them in the fields outdoor. They saw their city crumbling into heaps. Cries and dust were all mixed. Both saw the rubble of their house and heard cries of their mother, father and two sons for couple of hours; helpless. Till the sunset all went silent but they cried. They cry even now though blessed with more sons and a daughter. They always get frightened and push the children away whenever the earth jolts with quakes."

Well; with all the above are true cases of PTSD, this chapter shall hinge upon the literature review of PTSD and the Vulnerability prognosis of flood victims.

2.2 A word about PTSD

Any person (he or she) is considered to be afflicted with PTSD when experienced with the circumstance of an extreme nature whereby his/her safety and security of life is adversely threatened. One usually gets edgy, frequently becomes anxious and jumpy about that event. With the passage of time, many a people learn to adjust in the routine and hardships of life barring few who develop symptoms of wakefulness, restlessness, threatening nightmares and fretfulness thus creating a stressful disorder which is always post traumatic known as PTSD.

2.2.1 What is the "Traumatic Stress" part in PTSD?

The diagnostic review of PTSD is slender to those individuals who have undergone most threatening and distressing scenario(s) under the condition(s) of exceptional circumstance thus bringing catastrophic evidence. Basically, it must possess an appropriate potential to ground an importunate suffering in anyone's life; WHO Guideline (1992). Therefore it is imperative to know that the routine events of life which might induce little upset may not be addressed as "*traumatic*" in daily affairs e.g. separation or divorce issues among couples, students failing in the exams ; part or whole, dismissal from job or irregular domestic concerns. In such circumstances, if any sort of "*shock*" is caused, then only an "*adjustment disorder*" may be kept in view. A "*Traumatic Stressor*" must embody a "*threat*" to the life of an individual; whether his own life or the life of the one(s) associated with him/her, fear of an extreme nature and integrity of physical value i.e. dismay and/or frailty; PTSD Diagnostic Criteria ,DSM–IV, (1994). It might also be appreciated that some other factors of emotional bias like shame, sever anger, culpability or numbness may be attached with the emotional stimuli of a "*Trauma Survivor*". For a PTSD to develop among persons hinges upon two things i.e. "*Subjective Perception*" of the traumatic incidence as well as "*Objectivity of Facts"* e.g. all those people who receive minor bruises in a road traffic accident (RTA) having little blood smearing may develop PTSD symptoms by always thinking about that they are near to death due to that accident. It's not only that

easy to say that PTSD sufferer may become aggressive and hostile unless s(he) is the directly influenced by a terrific occurrence. In addition, all the witnesses, perpetrators and helpers in a terrific incident are likely to become sufferers of PTSD. At risk persons of PTSD may include:-

a. All those persons who have survived from all types of disasters and/or accidents.
b. Victims of criminal disorder / violence i.e. cases of physical or sexual exploitation (usually post a disaster in refugee camps), riots and bomb explosions.
c. Journalists, Police and Armed Forces Personnel subjected to war including war on terror. POWs are also in the same category.
d. Ambulance and emergency workers including fire fighters.
e. Patients (adolescent and adults) of life threatening diseases, especially women in post natal emergencies.

2.2.2 What is the "Disorder" part in PTSD?

The "disorder" part in PTSD is that which people might cause as rejoinder to most distressing trial; may be one or more such as premeditated acts of drastic nature, violence of interpersonal disasters, nuclear accidents as well as military combat; WHO Guideline (1992). It may occur at any part of an individual's life time including the childhood. The PTSD however; is not associated with such disorders which are not distinct in a sense that these usually occur after the impression of remorse or moderate stressors.

2.3 PTSD Symptoms

PTSD being the torment confusion; occurs in response to an extremely shocking event in somebody's life which may include military combat, terrorist attacks, violent personal assaults, natural disasters or serious accidents. Experts believe that its symptoms usually start immediately after the traumatic event but these may remain hidden until months or years. For its diagnostics, three distinct panoramas of symptoms are observed. Firstly, ***Re-experiencing Symptoms*** i.e. becoming upset when confronted with a

traumatic reminder or thinking about the trauma when you are trying to do something else; secondly, ***Avoidance and Numbing Symptoms*** i.e. detachment from people and places leading to social isolation, and lastly the ***Arousal Symptoms*** i.e. sleeplessness, easily startled, hyper-alertness to danger, intense fear, hopelessness, reduced stress tolerance, and decreased energy levels are hallmarks of this type of trauma which may affect the overall functional aspects of a person's life; Americas Heroes at Work, United States Department of Labor (2010). It is also very common for other conditions to occur along with PTSD, such as depression, anxiety or substance abuse; Nebraska Department of Veterans Affairs; (2007). These physical and emotional symptoms directly affect a person with PTSD's ability to maintain their occupational roles. These symptoms usually begin within three months of a trauma. There can be a possibility of delayed onset of PTSD disease and six months may elapse between trauma and the appearance of symptoms. However, in few cases, years may elapse before case(s) of PTSD appear because symptoms are often triggered by the anniversary of the trauma or sometimes with the experience of another traumatic incident. Symptoms may vary in frequency and intensity over time on case to case basis, Anxiety Disorders Association of America, n.d. (1980)

2.4 PTSD Prediction and Itinerary

Symptoms of PTSD usually appear with in first month after the happening of traumatic occurrence which may be marginally less than fifteen percent of the affected population; McNally (2003). However, these may be held up or postponed even for months or sometimes years to commence. Same is the case with its recovery too. At the start, there may be high ratio of PTSD prospects whose recovery is high in the years following a disaster but then it declines at fast pace while also exposing very high risk cases after a period of three years or more along with the multiplied risk of secondary issues such as maltreatment and misuse; Breslau et al (1991) and Kessler et al (1995).

Though the PTSD symptoms remain sever from one or two weeks post a disaster or onwards; Shalev et al (1997) and Harvey & Bryant (1998) but these may not predict to be converted into long term PTSD; Murray et al (2002). Probability that how much a

PTSD prospect is likely to benefit from rehabilitation efforts is not contingent upon the time elapsed between the disaster and appearance of symptoms; Gillespie et al (2002) and Resick et al (2002).

2.5 PTSD Framework Criterions

The class of stress disorders which are "*Post-Traumatic*" was introduced as a proper "*Medical Subject*" under subject "MeSH" as a term in 1981. Since the early 1980's, hundreds of studies, descriptions, and recommendations for treatment of PTSD had been found in the clinical, psychiatric and combat related literature. While also tracking back the history of PTSD Framework, Parry-Jones et al; (1994) revealed that "abnormal stressors are by no means a product of the twentieth century but have featured, sporadically, in all societies from the earliest civilizations." Stressful events are seen throughout; in the history of mankind but controversy says that PTSD is a "timeless condition", which existed before it was codified in modern diagnostic classifications. However, it was described with different names such as "*Railway Spine"* and "*Shell Shock" etc*.

Jones et al; (2003) expressed that PTSD is a *"Novel Presentation*" resulting from a modern interaction of trauma and culture. Formal trauma investigations can be traced back from the 19th century whose scope remains very limited to review i.e. only the railway accidents and military combats stay in the back drop; Parry-Jones; (1994). However, Kinzie and Goetz et al; (1996) provide an overview which seems very useful; ''since the mid-19th century, clinical syndromes resembling PTSD have been studied and described too in some of the instances". Anyway, understanding of PTSD remained quite a complicated subject by finding the answers about those questions which are concerned about nomenclature, etiology and compensation. Nomenclature placed PTSD syndromes under existing psychiatric conditions and disorders such as traumatic hysteria, traumatic neurasthenia and/or traumatic neurosis. Etiological issues solely describe PTSD with organic factors such as pre-existing personality impairments, intra-psychiatric conflicts and social factors. Later in the era after 2nd World War; experiences of the military campgrounds exhibited severe trauma in the shape of PTSD that became well recognized.

The study of post-traumatic stresses disorders gained speed and momentum at the same very time when Josiah Macy and Jr. Foundation published their several studies on "***combat fatigue***," "***How Can the Flight Surgeon better treat Anxiety?***", "***Notes on Men and Groups under Stress of Combat,***" and "***Personality Disturbances in Combat Fliers***" Jones et al; (1987). Later, the characterization of PTSD became more widened when not only combat-related stress was studied but also the reactions in response to overwhelming environmental stress lying outside the range of usual human experiences as cited by Parry-Jones ; (1994) as DSM-III. Turnbull (1998) stated that PTSD first appeared as an operational diagnosis in DSM-III (1980). It was later revised as DSM-III-R in 1987, made its first appearance in the ICD system in 1992 and subsequently revised as DSM-IV in 1994 by American Psychiatric Association. It is being followed and practiced today as criteria because its diagnostic tools are validated the best. Blanchard et al (2003) comment that the treatments of PTSD as defined by DSM-IV are quite effective as those defined in ICD-10. Difference is that the criteria ICD-10 is more effective for symptomized PTSD for a duration less than a month (*Acute PTSD*) where as DSM-IV is more effective for duration longer than one month or years of once traumatic experience or its periodic repetitions.

2.6 PTSD Relevance to Pakistan

None the less to say that why PTSD is getting more and more relevant to Pakistan; is quite evident. It is because there is an endless list of make and type of events and occurrences that embody PTSD. These are much related to natural as well as anthropogenic disasters e.g. accidents of all categories, sectarian based violence, target killings, terrorism of all sorts, floods, earthquakes, landslides and many more.

In 2009, death toll due to suicidal terrorist attacks bench marked around 3325, which gradually came down to 2320 in the year 2014 and 1086 in 2016 respectively; One hundred thirteen thousand terrorist attacks are estimated from 1970 to 2015; Gary Lafree (2016). On the overall, 67400 Pakistanis had been killed in terrorist attacks since last fifteen years from the year 2002 to 2017; Farid Sabri (2017). On the other hand, 1.8

Million Pakistanis became Internally Displaced Persons (IDPs) due to acts of violence where as 7.71 Million people got displaced due to natural disasters; Munaza Khan (2015). Post EQ 2005, in a sample of 1200 affectees, nearly 33% men and 55% women were found sufferers of PTSD which got aggravated by 2% among those who were displaced in the tent villages being psycho morbid and also due to allied inexpressible abuse. In a cross sectional survey of 300 respondents selected from those districts which were closer to epicenter, it was revealed that prevalence of symptoms of PTSD was too high even after the lapse of thirty months of EQ.

From this data, state of PTSD sufferers can be well imagined. Story does not end here, almost daily on the un-reined social media and the so called television channels, horrific scenes of violence and trauma are being telecasted relentlessly causing further arousal in the existing PTSD carriers. Side doze to these events are such incidents which do not find their way to the broadcasted media rather find a quick and better place as well as massive distribution on the unchecked social media. These include cases of child abuse, religious extremism, long sitting protests (*Dharanas*), honor murders/killings, acid throwing cases on women's faces alongside the multitudes of domestic violence. All such incidences pose adequate potentials to flare up pre-existing PTSD scenarios. Older and unmarried female family heads who were unemployed or had too low an income; living in temporary shelters was found to be highly exposed to the risks of PTSD though the Islamic Religious motivation had been the most protective element in such an inclination; Filza Hussain (2015). Similarly, parallel studies revealed that 30 % depression was there in earthquake affected districts whereby women were having four times more depressive tendencies as compared to men i.e. 1:4. Besides this; women were more likely to have developed the PTSD twice as men. Data collected from over 1100 school children revealed that 65 % were found for having significant symptoms for PTSD even eighteen years after the earthquake where as 30% children depicted symptoms of emotionally and behaviorally unsuitable and unreliable puberties.

2.7 Vulnerability of Flood Fatalities to PTSD

It is a fact that the natural disasters happen all of a sudden with awesome devastation causing refutation and shock bringing along intense traumatic pressure. According to American Psychological Association, “trauma is a poignant rejoinder to a dreadful episode just like an accident, a case of rape or a natural disaster.” Such experiences are sinister to human life because these traumatize large clusters of population imminently there by also spreading epidemics over a large area having the guilt of survivors plumbing with the symptoms of PTSD.

Among the natural disasters, floods are unique in PTSD as these depict different dimensions related to the perception of human beings. Correspondingly, the floods have socioeconomic as well as psycho emotional perspectives on the sufferers with regards to the duration of floods, extent of life lost, injuries to the sufferers themselves and their loved ones, damages to the properties, impact of terror, degree of helplessness, horrible scenes, smells of the decay and dead bodies, internal displacement and the non-availability of psychosocial support. These all are the positional effects of disaster which are viewed to be treacherous in many situations. PTSD factor among the fatalities of flood; carry various disorders too like anxiety, stressfulness, fearfulness, sleeplessness, hopelessness and helplessness. Stressfulness is directly proportional to the PTSD vulnerability and depressive tendencies. More stressful the flood is due to its peculiar nature of devastation; higher the depressive tendencies are and wider the span of succumbing PTSD vulnerabilities. Like other PTSD criterion, floods too have similar symptoms.

2.7.1 Characteristics of PTSD vs Floods

The disorder is post traumatic and is identified commonly as post exposure to a traumatic occurrence. With regards to floods, it has four types of characteristics i.e. Re-experience nature, avoidance nature, numbing and that of hyper arousal. For a PTSD to occur, it is a must that the distress of clinical significance, impairment and/or mutilation in the functioning of a survivor should be clearly observed among the victims of flood for at least a month or

more. By enlarge; PTSD should be commonly noticed as secondary disorder of psychological nature linked with certain other disorders associated with anxiety; Friedman, Norris, Byrne, Watson, Kanaisty & Daze (2002).

2.7.2 Emotional Outflow of Floods

All the consequences of natural disasters which are related to human emotions are directly proportionate to the degree of stress. In Pakistan alone, floods are a stressor of constant nature since many decades. All those people who are affected by flood have a strong sense of unaccountability and uncontrollability. Both these factors stay smudged and remain sever in nature because it gets absolutely difficult to envision the quantitative prediction of the disaster. Alongside, gauging the environment under such conditions is another dilemma. It has generally been observed that the current stressors which victims suffer in the face of a disaster also merge their reactions in a relative response. Livelihood loss, physical or emotional pain, internal displacement, loss of hard earned savings and monetary pasting are few among adverse effects of disaster which a survivor must tolerate.

2.8 PTSD Impacts of Floods

In the developing countries as well as developed countries, floods are one of those common natural calamities having the impacts occasionally devastating e.g. China Floods 1959, Bangladesh Floods 1974 and Southeast Asian Tsunami, December 2004; Catholique de Louvain, (2005). Health impact of floods diverges from area to area and from people to people depending upon the vulnerability of population and type of flood; Western K (1982) and Hajat S, Ebi KL, Kovats RS et al (2003). Our planet earth is passing through the era of climate change where the sea levels are rising and the precipitation patterns are getting altered. Such scenarios are constantly engaged in enhancing the intensity and frequency of floods across many a regions of the world; Intergovernmental Panel on Climate Change; (2001). Floods are usually classified with respect to their nature and origin. When we say origin; it means cause e.g. structural failure, extreme tides and any failure of structures and by nature we mean regularity of

floods, onset speed, velocity, water depth, temporal and spatial scales. When we review the health impact of floods, these also vigorously attach the stress related factors such as various mental disorders, PTSD syndrome, and suicides.

WHO too identifies that "flood consequences related to mental health have not fully been addressed by those in the field of disaster preparedness or service delivery; although it has generally been accepted that natural disasters, take a heavy toll on the mental health of the people involved, most of whom live in developing countries, where their capacity to take care of commonly pronounced mental disarrays especially concerning depression and anxiety is extremely limited; WHO Report (2001). Many a studies have revealed that impact of flooding on human mental health had been from high to middle and low income countries i.e. Australia ; Abrahams MJ, Price J. Whitlock FA, et al (1974), United States; Mesick ME (1978), United Kingdom ; Bennet G. (1968) and Poland Neuberg M, Jakubowska-Szwed B, Neuberg J (2001). In the study of Bangladesh Floods; Durkin MS, Khan N, Davidson LL, et al (1993) found similar results but a report on Bennet's analysis of Bristol Floods 1968 depicted a significant increase i.e. 19% vs 7 % where the P value is ($p < 0.01$). As compared with non flooded localities, men and women both were found to have been consisted with sleeplessness, irritability, depression and anxiety without any discriminatory significance. Similar findings accrued in Brisbane Floods 1974; Abrahams MJ, Price J. Whitlock FA, et al (1976). However, men and women between the ages thirty five and seventy five years were found to have suffered with significant impacts; Price J (1978). In a study conducted for adults having ages between fifty five and seventy four respectively in 1981 and 1984 contained in poor socioeconomic buildups; the exposure of flood was significantly associated with increase in anxiety/physical symptoms (P Value $p<0.008$) and depression (P Value $p<0.005$) as compared with pre-flooded recorded depressive tendencies. Logue et al (1981) affirmation was supported by Phifer et al (1990) assertion that "low income people were more vulnerable to adverse impacts of disaster. Ginexi et al (1989) conducted a longitudinal research on the depression symptoms and compared the results of pre-flood and post- flood scenarios. He found that odd ratio had increased significantly from 59 percent to 95 percent. In a study conducted in UK, it was revealed that psychological distress had increased manifold i.e. by four times or so among the affectees whose home

was flooded as compared to those whose home had not been flooded. In the backdrop of Anges Tropical Storm which had had a wide spread flooding in 1972 at Pennsylvania; two control studies of the case of impacts of flooding on mental health were conducted by Logue JN, Melick ME, Struening E (1981). Interestingly, 1st study was conducted three years after the flood targeting all males (working class) between ages twenty five to sixty five years where as second study was conducted five years after the flood focusing on all women having ages twenty one years or more. In both the studies, symptoms of severe mental disorder were reported by the respondents of household extremely flooded as compared to those with non-flooded. However, the statistics were not significantly different. Perhaps the authors might have contemplated that the failure to find a strong relationship; may in parts be the result of length of time recorded which had surpass the last impact of a catastrophic disaster.

Few of the studies had been leveled on the impacts of flood on the mental health condition on children. Certain exceptions were noticed in the study; Durkinn et al (1993) observed changes in post flood scenarios with regards to behavior of children (bedwetting) having ages two to nine years. Subsequently, none out of one hundred sixty two was found to be very antagonistic in behavior before flood as against sixteen children who were found very aggressive in post flood period. Bedwetting depicted increase from 16.9 % (pre-flood) to 40.5 % (post flood).

In Netherland; sixty four children and parents [n=530] were interviewed by Becht et'al (1998) six months after the flood and recorded 15 to 20 % of the children suffering from moderate to severe PTSD. Subsequent studies for Opole Floods in Poland (1997) revealed long term negative effects on the children's well being having ages between eleven to fourteen years and eleven to twenty years respectively with significant increase in PTSD possessing issues related to discontentment from life and depression. Findings as studied by Russionello et al (2002) were also not in-different after six months of Floyd Hurricane when children between the ages nine and twelve years had developed severed PTSD effects.

PTSD as characterized by circumstantial avoidance duly stress associated i.e. intrusive memoirs, various stressors, disturbances of sleep, anger, irritation,

deficient concentration and inadequate vigilance ; became culture specific and over diagnosed when floods came to interplay; WHO Report (2001).

In Canada, Quebec Floods were studied in the region of Lac St. Jean and Saguenay in 1996. It was revealed that there was considerable increase in the emotional anguish coupled with PTSD stressors among the flood victims; Maltais D, Lachance L, and Fortin M, et al (2000). Evidence extracted from the work of Puerto Rico and Norris et al (2000) also suggests that symptoms of PTSD are directly influenced by the factors such as age, culture, level and scope of flooding. Verger et al (2003) examined the impacts of mental health; at least five years post floods in 1992 at Vaucluse in France and accomplished that their experiences concerning the natural disasters were by nature subjective and not completely reliable i.e. the results were significantly worst not only for women but also those (subjects) who were older than thirty five years; Verger P, Rotily M and Hunault C, et al (2003). Some of the disaster reports from US analysis substantiate that suicide cases due to flooding was rare where by only one case is reported for having committed suicide due to post traumatic stresses after four years of flood; Krug EG, Kresnow MJ and Peddicord JP, et al (1999). A report from periodic flooding of Yangtze Basin of China suggests that suicide cases had been forty percent more than the rest of country; Zhang YQ, Zhang J and Yang H (1999). However; current hypothesis does not support that the rate of suicides increased due to floods; Chen J, Deng X and Xu F, et al. (2001). Other health impacts; extra to the post traumatic had been the Epilepsy, Lymphoma, Leukemia, and Impulsive Abortions etc; Zhongguo Ji Sheng Chong Xue Yu Ji Sheng Chong Bing Za Zhi (2002).

Chapter-3

METHODOLOGY

3.1 Introduction

Methodology of research has been defined in current chapter. Both the quantitative as well as qualitative methods had been exercised alongside the constructive interviews and informal discussion to work out gaps and to know measures to fill in the details to proceed further efficiently. Before proceeding to detailed methodology, it is considered pertinent to mention few important characteristics of Nowshera District collected through open source as under:-

a. **Area** : 1750 sq KMs
b. **Population (2017 Census**) : 1518539 growing @ 5% per annum (*Urban*: 338648 & *Rural*: 1179891) having **density** 870/ Sq KM
c. **Health**: C.B. Hospital, DHQ Hospital and CMH Nowshera
d. **Languages / Dialects** : Pukhtu 88%, Punjabi 4.5%, Hindko 4.3% and Urdu 3.2%
e. **Castes/Sub-castes** : Khattak 57.8%, Gumoriani 12.2%, Kheshgi Batakzai 9.7%, Kakakhel 9.3%, Babar 6% and Awan, Paracha, Afridis, Tiazi 1% each and others 1%.
f. **Education Ranking (2016)**: 1st among 155 districts of Pakistan
g. **Facilities & Infrastructure Development (2016)** : 42nd among 155 districts of Pakistan
h. **Rivers** : Bara and Kabul ; (Bara River enters in Kabul river at Akbarpura & non flooded)

3.2 Sources Used

In addition to consulting the primary data and internet browsing, the author had to conduct many visits on ground to acquire details of flood affected areas and confirm these while using the GIS techniques. Had to visit experts to make headway for pilot study followed by main study to collect the secondary data. Following addresses had been consulted during the course of this research:-

a. District Nazim (Liaqat Khattak) & his team

b. Head Focal Person PDMA (KPK) and DDMA Nowshera
c. DCO Nowshera and DPO Nowshera
d. Grade-I Staff Officer at Garrison Headquarters, Nowshera Cantt
e. MS DHQ Hospital, Nowshera
f. HoD Psychiatric Dept (including a Psychologist) at CMH, Nowshera Cantt
g. Senior Coordinator, Office of the Relief International (KPK)
h. DDMO at DDMU Nowshera (KPK)
i. Office of The Practioners Disaster Management Pakistan (PDMP Islamabad)

3.3 Research Techniques Applied

Since the author himself was witness of Nowshera Floods 2010 while serving at Nowshera Garrison on the eve of this disaster break out. Most of the data and materials is author's own collection. Secondly, towards the national service of disaster relief, author himself had been active member of such operation and seen physically the devastation caused during and post flood. Therefore, a comprehensive account of data had been acquired. To develop this research further; following techniques had been applied:-

a. Understanding the causes, factors and categories of floods in the hazard zone
b. Carryingout an express assessment of Nowshera Floods 2010 to include:-
    i. Damage assessment in order to know the vulnerable areas
    ii. Impacts Analysis
    iii. Degree of displacement
c. Vulnerability Analysis of Nowshera Floods 2010 to include:-
    i. Identifying the Peshawar Basin of Kabul River
    ii. Flood Inundation Mapping of Nowshera Floods (Peak Season)
    iii. Use of GIS Techniques
    iv. Sequential Arrangement of Image Development.
    v. Digitization using Arc GIS
    vi. Sequential Arrangement of Image Development for the Flood Plain.
d. Identifying the Vulnerable areas/groups and then carrying out the Flood Risk Assessment of Nowshera Floods 2010.
e. Conducting the Pilot Study of selected five localities to seek the correctness of data and reliability of instruments applied

f. Conducting the Main Study to seek the PTSD impacts on the vulnerable areas/ groups at various sectors (twenty seven locations)

PART – I: AN EXPRESS ASSESSMENT OF NOWSHERA FLOODS - 2010

3.4 Floods in General: Causes, Factors and Categories

Floods happen due to variety of reasons including the phenomena of nature and other developments manmade. Floods can be segregated on the basis of such causes also which are related to heavy increase in the amount of water discharge in the channels and streams; Kanso et'al (2002).

3.4.1 Flood Factors

Combination of Hydro-met and manmade physiological conditions as mentioned in the following table outline the basis to form floods; Erlewein (2008):-

Hydrological Conditions	Met Conditions	Human/Manmade Conditions
o Moisture level of soil o Level of groundwater initially stored pre-storm o Infiltration rate (in the natural surface) o Impermeable soil cover (due to human action) o Uneven channel course o Protective Embankments (yes/no) o Amount of time delay from catchment areas o Poor drainage systems o High tide effect	o Temperature Variations o Storms scale (small) o Cyclones o Amount of rain fall (mm) o Quantum of snow melt	o Landuse planning and practices o Mulching of soil surface (due to deforestation and urban development) o High surface run off o Flood plain intrusion o Poor/lack of maintenance of protective structural measures o Quick upstream drainage due well developed drainage systems o Heightened flood peaks o Climate change o Global warming o Degree and frequency of rainfall

Table 3.1 : Flood Factors

3.4.2 Flood Categories

Basing on the conditions stated in the above table, urban floods are classified into four different domains; Erlewein (2008) as under:-

i. **Flash Floods:** Whenever there is swift discharge of surface run off or rapid amassing of upstream waters accumulated from catchment areas due to massive downpour, landslides, cloud bursting or dam breaks; flash floods are caused. Resultantly, a jagged rise in water takes place followed by rapid decline giving out superb flow velocities.

ii. **Local Floods:** These are the features of monsoon and are subjugated after the intensive precipitation for longer durations. Usually caused by depression in the atmospheric pressure and provoked by pre-existing and impervious soil inundations. Local floods burst out from very high surface run off due to thick urban development thus violating the current drainage capacity of soil.

iii. **Riverine Floods:** Activation of such floods takes place due to snow melting or precipitation at an intense rate in the areas of upstream catchments or these may be caused due to persuasion of high tide in the delta zone of river when falling into ocean. Physical conditions such as type of soil, density of vegetation as well as the land use directly influence the run off amount. These floods happen when the amounts of surface run off exceed the capacities of local flow. Such floods are characterized by a slow rise and recession of water levels elapsing between few weeks to several months in the areas where there are gentle slopes. Poor management and weak functional practices adopted at flood control structural centers on the upstream invite such floods. All those urban localities which lay down the middle or lower portion of valleys get dangerously exposed to expanded devastation of reverine floods, especially when the levees are breached by the storming waters in such areas which lay below the minimum flood level. This devastation is not only physical but also contains the intense stress and trauma to the sufferers. Therefore, responsibility of both the structural and non structural protective measures rests with two or more administrative and

geographical jurisdiction functioning under the Federal Government thereby incorporating all the stake holders. Effective Flood Control Measures (FCMs) would therefore be needed upstream to bring under control reverine hydrological condition downstream well in time along the river course. If a river course involves two or more countries and it runs through more international borders then the course of trauma and stress management becomes an international concern to be governed through the mutual Flood Managing Commissions without having compromised the Human Rights as well as development interests of the belligerent boundaries.

iv. **Coastal Floods:** Besides the earth quakes taking place well inside the sea bed; stifling depressions in the climate usually cause high tides hitting the coastal urban vicinities thus shifting the devastation into low lying coastal suburbs and the river estuaries. Traumatic stress in this category has variety of impacts.

3.5 Impact Analysis

Along the Kabul River Basin, among the worst districts worth mentioning were Swat, Charsada and Nowshera. In Nowshera alone, approximately 94000 or more mud homes (kutchi abadi) had been washed away while displacing many a thousand people causing enormous stressful trauma upon the displaced and highly vulnerable population. All the utilities (electricity, suigas or water) had become nonfunctional. In such a scenario, provision of medicines and readymade food supplies had become inevitable. All the sanitation system had been choked in the areas having silt infested drainage system. Water supply systems had been polluted at the rate of 98 % or had become contaminated due to spreading of almost 2500 dead animal carcasses throughout the district leading to serious threat of communicable diseases i.e. diarrhea and scabies etc. Alongside, psycho morbid trends had also been noticed; more among those displaced who had lost everything. Staple food crops i.e. rice and corn had been damaged to almost 10% where as cash/livelihood crops i.e. sugar cane and tobacco had been damaged to around 15%. Pie Charting of the flood impact analysis is given as under:-

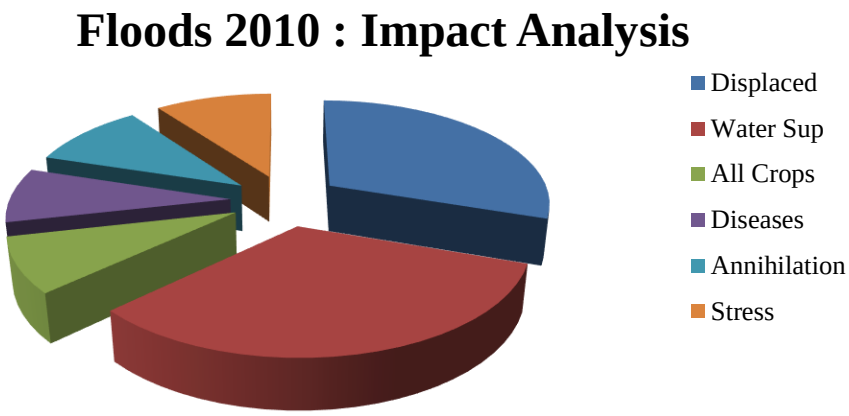


Figure 3.1 : Impact Analysis Floods 2010

3.6 Degree of Displacement

By about 5 August 2017, displaced population had made their own improvised shelters of plastic sheets or still had been lying in the open awaiting the diseases and sufferings to arrive. Most of the displaced persons had become the target of Acute Respiratory Infections (ARI). Among those affected, 90 % families had been displaced from their actual place of origin. Out of this displaced population, 34 % were living with their relatives, 44 % went to live with strangers and host families, 10 % had taken refuge in nearby schools, 7 % opted to live with their friends, 4 % had rented houses in the safe localities whereas 1 % resorted to have make shift arrangements. Later, it got to remain within the normal confines slowly and gradually. Details as under:-

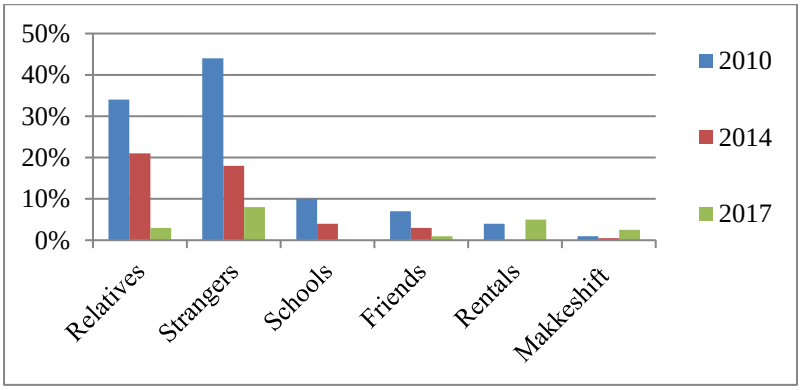
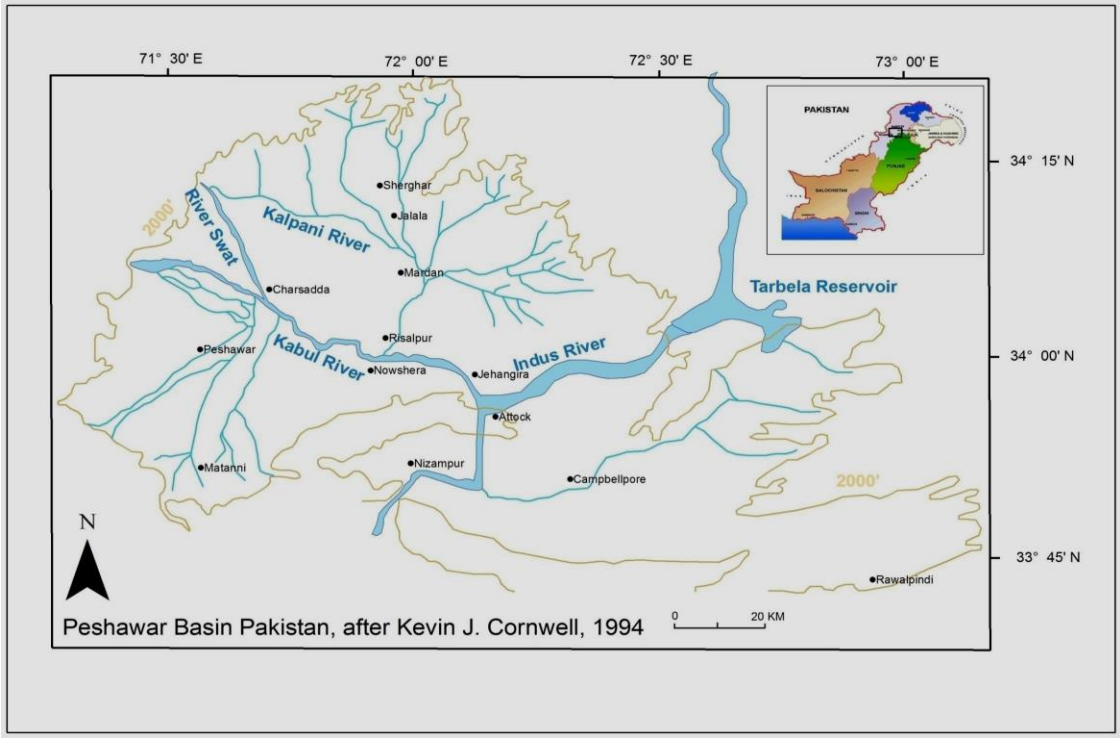


Figure 3.2 : Degree of Displacement 2010-2017

PART- II : VULNERABILITY ANALYSIS OF NOWSHERA FLOODS -2010

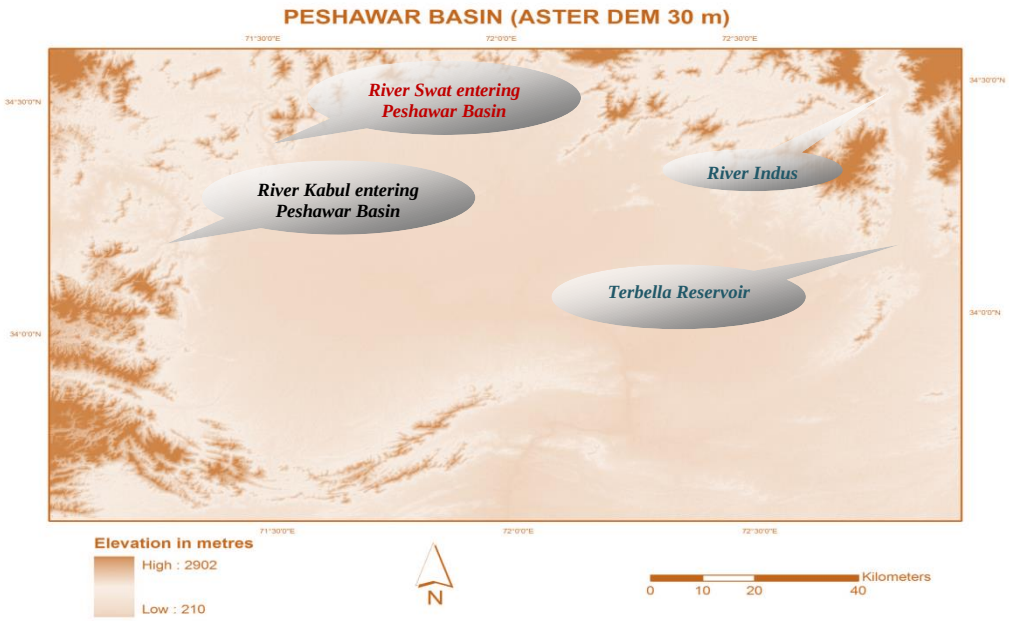
3.7 Flood Risk Assessment and Inundation Mapping

Flooding of Kabul River in 2010 along Peshawar Basin was one of the largest in the history of floods in subcontinent. In the North Western Himalayan Region, the rainstorm gushed out millions of cusecs of water on 27/28 July 2010 and the process went on up to 30 July 2010 till a time the flood also touched its peak. As a result, major areas of Nowshera, Charsada and Peshawar districts had been inundated. However, Swabi and Mardan Districts had been inundated partially causing wide area damage and devastation. Purpose of this section is to show the Nowshera Floods on the Risk Map of Kabul River inundation recovered through the analysis of flood modeling with the view to correctly identify the sampling areas duly impacted by PTSD.



Map 3.1 : Map of Peshawar Basin by Kevin J.Cornwell ; (1994)

In the above map, Peshawar Basin of River Kabul as well as Indus River are given showing the general area of Nowshera District where as in the following Map. (Map 3.2), an ASTER DEM 30M is representing the topographic view point of Peshawar Basin.



Map 3.2 : Peshawar Basin Image: ASTER DEM (30 M)

3.8 Flood Inundation Mapping of Nowshera Floods (Peak Season)

Following different techniques were used to perform this task:-

3.8.1 Input Data : Following data was used as an input:-

i. SPOT Sat Image 2.5 M (Pre Flood) representing colored composite with red, green, blue and NIR bands

ii. NASA Satellite Image (Post flood) taken on 4 August 2010 representing colored composite with red, green, blue and NIR bands

iii. ASTER DEM 30 M

iv Google earth data with 0.6M resolution obtained on line

v. Topographical sheets in general

vi. Some GPS data obtained through outdoor/field visits

3.8.2 Adopted Methodology: Following techniques had been deployed to evaluate the input statistics for mapping the inundation during the peak flood:-

i. **Remote Sensing (RS) Techniques:** It includes both the visual and digital image processing techniques. ***Visual Remote Sensing*** involves the actual interpretation of satellite imageries in order to identify different targets in an image with a view to extract and manipulate useful information or information of interest while carrying out digital image analysis. ***Visual Image Processing*** was performed using elements like shadow, tone texture, shape, size, pattern, site and association. On the other hand; ***Digital Image Analysis*** was done through digital image processing. It is usually characterized as a set of special techniques using the computer processing tools which develop the visual manifestation of images having hauled out the information from remotely sensed descriptions. In the current study geometric correction was applied through drawing various colour composites while performing supervised classification of images. Later the NASA prepared satellite image (post flood) was drawn and accordingly geo-referenced while performing an image to image geo referred procedure. Geo referencing of topographical sheets was conducted while using the coordinates given on their border.

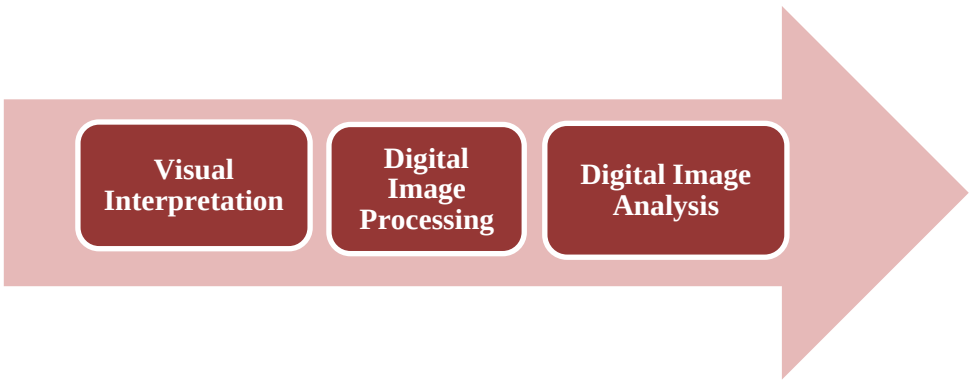


Figure 3.3 : Process Diagram of Image Interpretation via Satellite

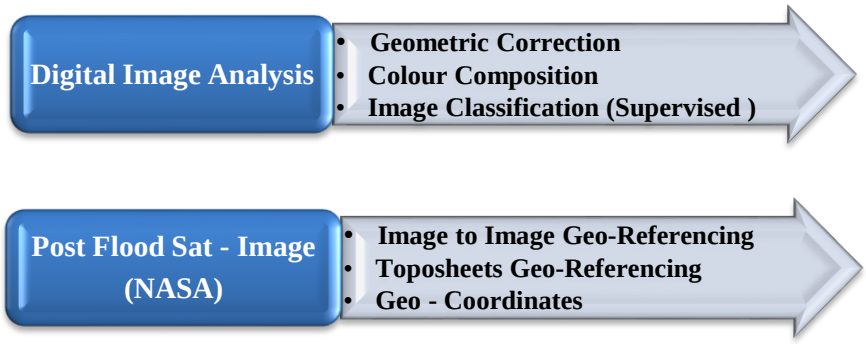


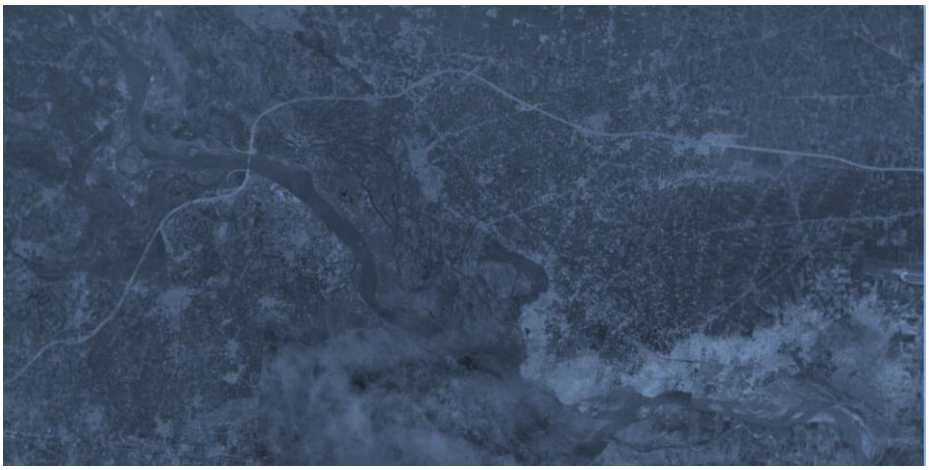
Figure 3.4 : Process Diagram of Developing Post Flood Satellite Image of NASA-Nowshera Floods 2010

ii. **Geographic Information System (GIS) Techniques**:

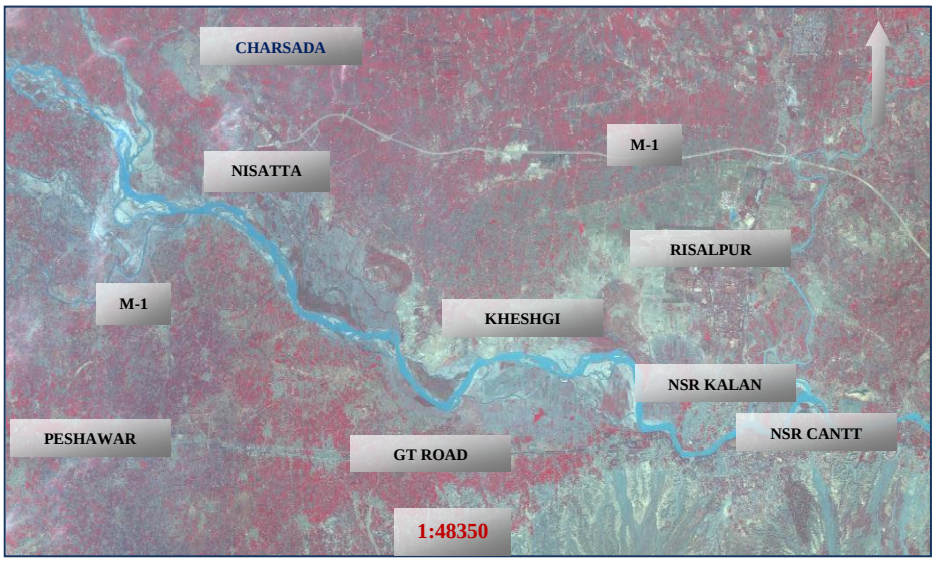
GIS Technique is such a platform which is geo referenced readily with a view to absorb data or assimilate it from a commonly geo-referenced platform to assimilate data from divergent nature sources which could be displayed easily in layer by layer categories. To perform this task in the current research; first of all, geo database was created and then digitized. Later, spatial overlays were created while making use of Google earth images.

iii. **Outdoor Visits**: These had been highly instrumental for carrying out ground truthing while making use of flood heights at various places as well as the GPS data.

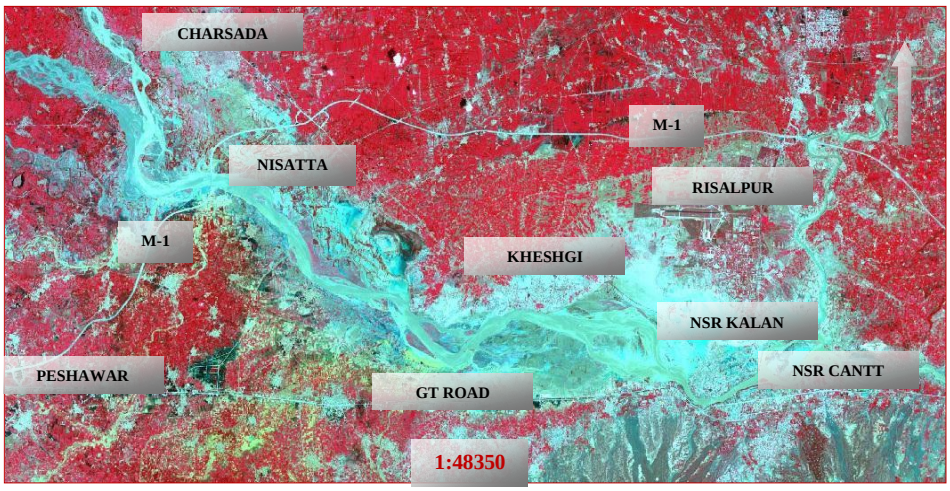
3.8.3 Sequential Arrangement of Image Development. While using all the above mentioned techniques, certain images of the flooded areas of Nowshera and surroundings were developed to show the topographic vulnerability of flood zone. These are shown below:-



Map 3.3 : Simple Colored Composition taken from Google Earth-Natural

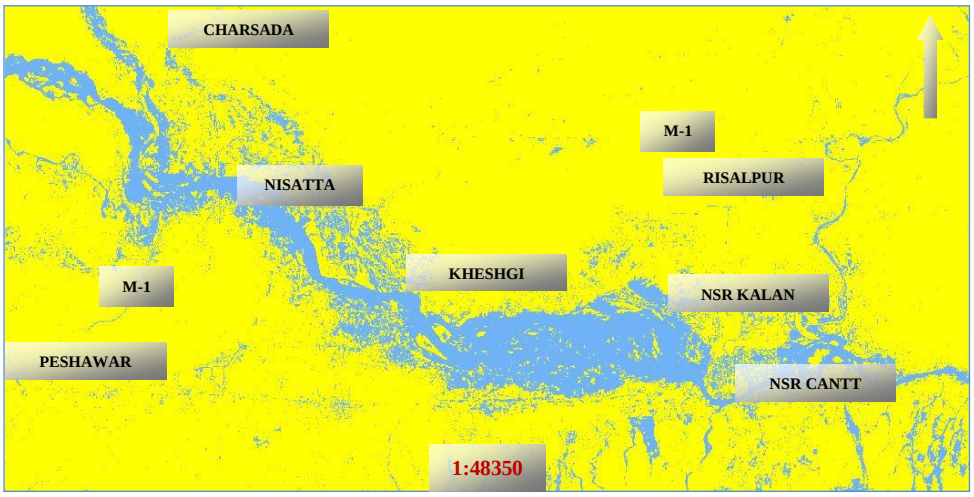


Map 3.4 : Colored Composition False – Pre Flood Image : SPOT



Map 3.5 : Colored Composition False – Post Flood Image

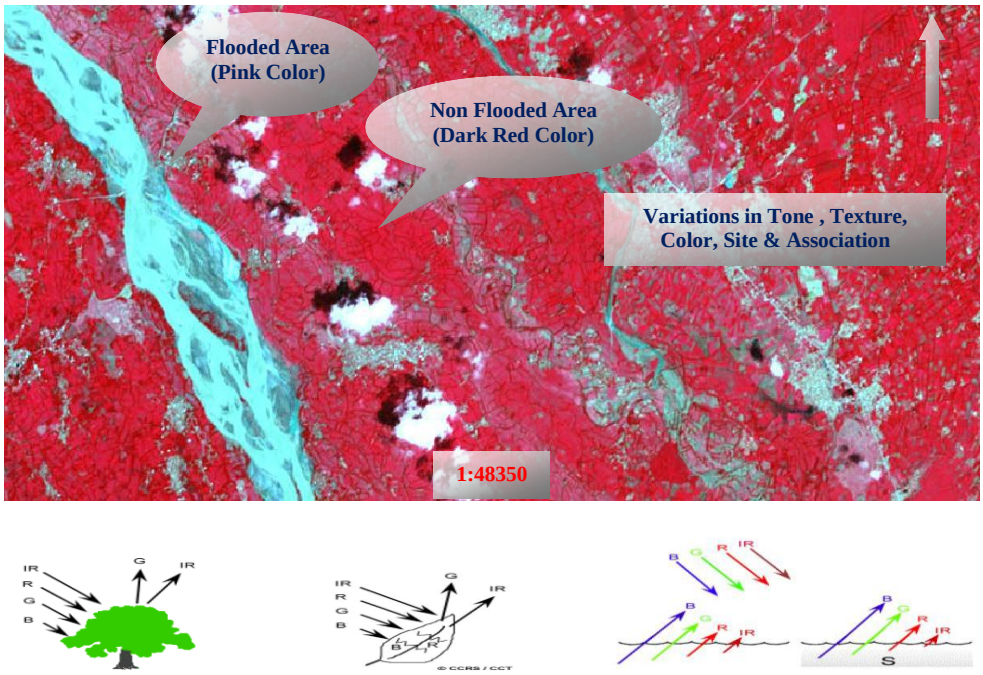
(4 August 2010)



Map 3.6 : Developed Flood Map – Post Flood Image

(4 August 2010)

Note :- Above flood hazarded vulnerability map had been developed by applying supervised classification method which was subsequently used for flood inundation mapping in GIS.



Map 3.7 : Map Showing Visual Interpretation for Peak-Flood Inundation

[Note : This map has been developed using GIS Techniques]

3.8.4 Digitization using Arc GIS : Following layers were digitized using Arc GIS :-

i. Peak Flood Inundation Map was obtained in the form of Geo-database using images of NASA dated 4th August 2010

ii. Indus and Kabul rivers courses containing the main rivers and their small tributaries i.e. it was a SPOT image with 2.5 M resolution.

iii. Contours extracted from Topographical Sheets (GT) with RF = 1:50,000 and also an ASTER DEM (30M)

iv. Point Map showing flood height at various places; collected through different field visits

v. Spatial overlay of the above layers was recovered on line through Google earth images.

vi. Total of the area, covered by water through surface run off was 332 Sq Km as against the area of normal river course 50 Sq KM while the partial inundation was 82 Sq KMs alongside full

inundation of 202 Sq KMs. Same has also been expressed fully in the following configuration of pie chart :-

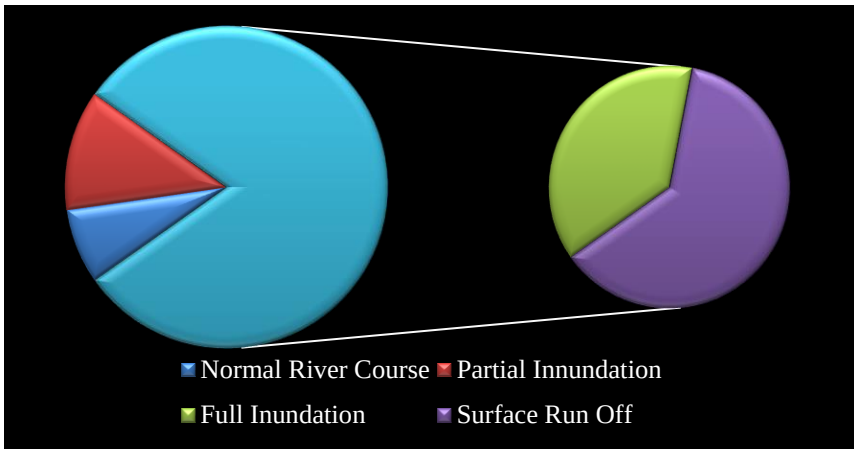
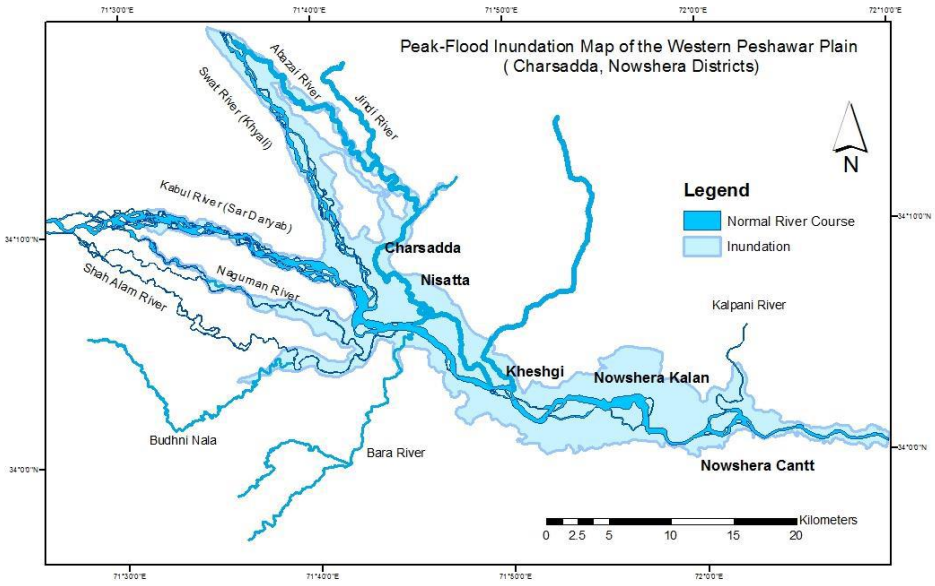


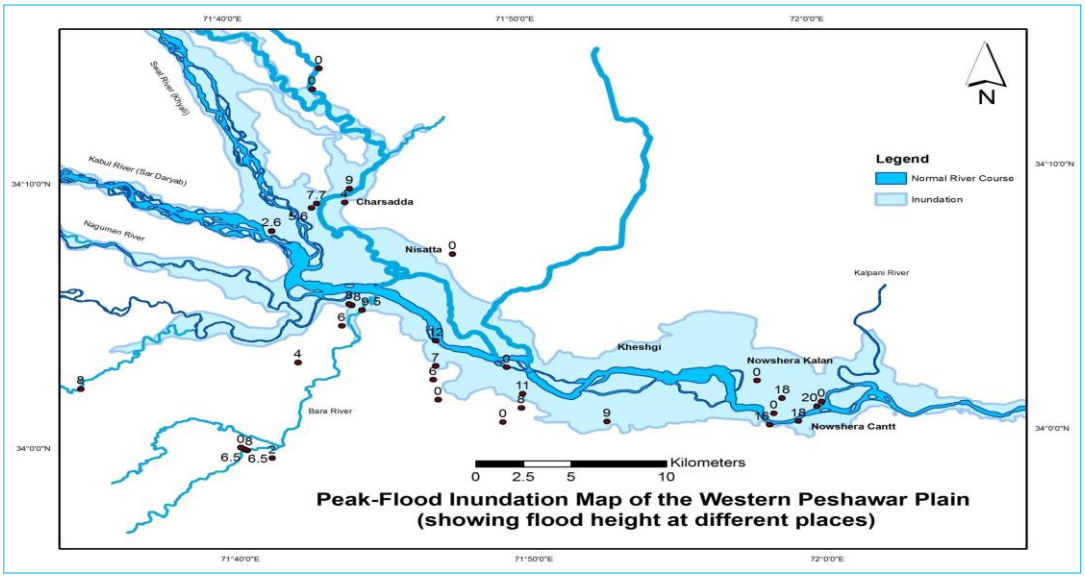
Figure 3.5 : Area covered by Nowshera Flood Waters - 2010

3.8.5 Sequential Arrangement of Image Development for the Flood Plain

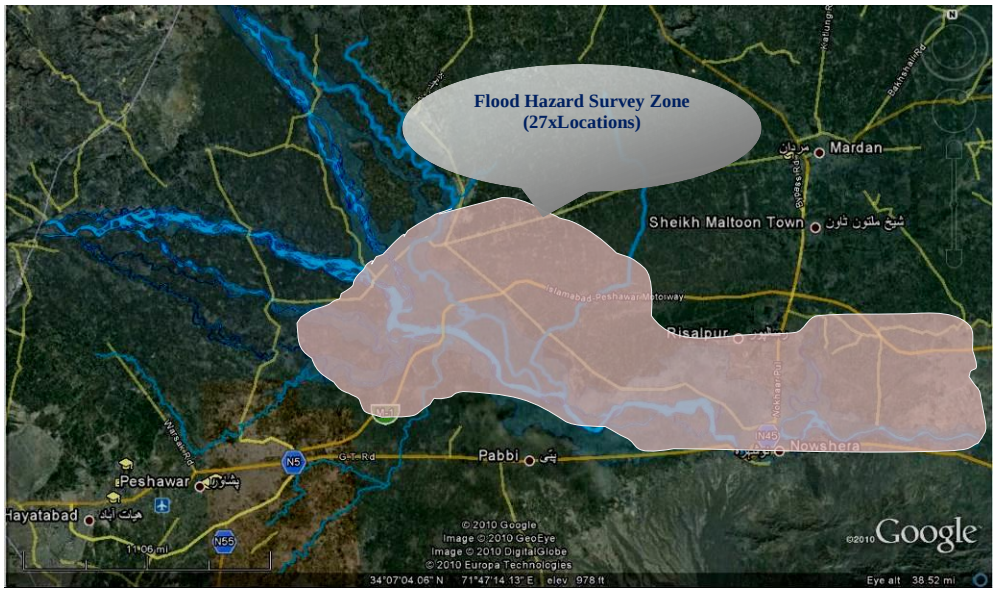
Following are the few Maps developed in this regard:-



Map 3.8 : Map Representing Peak Flood Inundation (Charsada & Nowshera Districts)



Map 3.9 : Map Representing Flood Height at Divergent Places during Peak Flood Inundation



Map 3.10: Map Representing Spatial Overlay of Vulnerable Zone [Google Earth ; (Nowshera District)]

Map 3.11 : Map Representing Spatial Overlay Close Overview

[Survey Area – Google Earth (Nowshera District)]

3.9 Vulnerability Assessment

3.9.1 Sector wise Elements at Risk : It was 27 Jul 2010, when a heavy down pour in the Khyber Pakhtunkhwa (KPK) Province of Pakistan which spread a massive devastation due to riverine flooding of River Kabul, impacting a population of 1.5 Million or beyond and adversely damaging around 156950 houses. Magnitude of annihilation had been much expanded by about 30% or more between 3 to 6 August 2010 due to water logging and further demolition of feeble structures. Most vulnerable among the affected were; the elderly people, children and those women who were pregnant. Vulnerable groups had been asked to leave their homes and take refuge on high grounds or on the building roofs tops without shelters. Relief goods could not be managed to the right destinations due inaccessibility of poor or worsened communication infrastructure. Sector wise (village by village) ***Elements at Risk*** falling in the flood hazard zone (refer Maps 3.8. to 3.11 above); highlighting the percentage of damages caused by Nowshera Floods are explained below in the given table. Cumulative effect accrued through physical ground check and survey is illustrated at the end:-

Ser	UCs / Sectors (Village/s Complex)	Human Life Loss	Families Affected	Financial Loss	Health & Education Facilities	Agri Infra	Comm Infra	WASH (Water & Sanitation Hygiene)
1	Abazawal Kouruna	-	90%	80%	100%	100%	100%	75%
2	Bella Killay (Katozai)	-	88%	85%	100%	100%	100%	100%
3.	Banda Sardar Ghaiba	1%	80%	88%	100%	100%	100%	100%
4	Banda Sheikh Ismail	2%	92%	95%	None	100%	100%	100%
5	Cheena & Mirza Dher	-	92%	90%	75%	50%	50%	100%
6	Chowki Town Complex	-	40%	56%	50%	100%	50%	50%
7	Dheri Katti Khel Comlex	-	49%	56%	50%	100%	50%	50%
8	Dagi Mukarram Khan	-	10%	50%	50%	75%	25%	75%
9	Dildar Gharia	-	92%	95%	100%	10%	100%	100%
10	Fatma Khel	-	62%	76%	100%	50%	100%	100%
11	Hadzai	-	52%	71%	100%	50%	100%	100%
12	Rajar Complex Complex	-	69%	88%	100%	50%	100%	90%
13	Mistri Banda	1%	96%	95%	75%	100%	100%	100%
14	Mahajar Camp (Utmanzai)	-	96%	98%	100%	100%	100%	100%
15	Munda Head (Katozai)	-	96%	98%	100%	100%	100%	75%
16	Misssri Banda (Pir Sabak, Mian Killi & Zara Miana)	3%	97%	98%	75%	100%	100%	100%
17	Mirza Dher Complex	-	92%	96%	100%	10%	100%	100%
18	Nowshera Cantt Complex	2%	38%	46%	50%	100%	50%	50%
19	Nowshera Qallah Complex	1%	32%	42%	50%	100%	50%	50%
20	Nisata & Kheshgi Complex	2%	92%	94%	100%	100%	100%	75%
21	Pareech Payan & Utmanzai	-	43%	47%	50%	50%	50%	50%
22	Qamar Killi (Sadar Glara)	-	92%	96%	100%	100%	100%	75%
23	Shinkai &Umerzai Complex	-	52%	78%	100%	50%	75%	75%
24	Salar Zai & Rajar Complex	-	52%	48%	100%	50%	100%	50%
25	Sadar Ghana	-	92%	95%	100%	100%	100%	75%
26	Salgaro & Katozai	-	96%	97%	100%	100%	100%	100%
27	Tarnab Complex (NIFA)	-	46%	51%	50%	50%	50%	50%
28	Cumulative Net Effect (n=average)	**1.71 (2%)**	**71.22 (71%)**	**77.92 (78%)**	**78 (78%)**	**81.4 (81%)**	**75 (75%)**	**77 (77%)**

Table 3.2: Details of Elements at Risk with Percentage of Damages

[Nowshera Floods 2010 ; Ground Checked/Survey Data (2017/18)]

All the Elements at Risk are also plotted in the following pictogram giving the increasing potential of vulnerability assessment:-

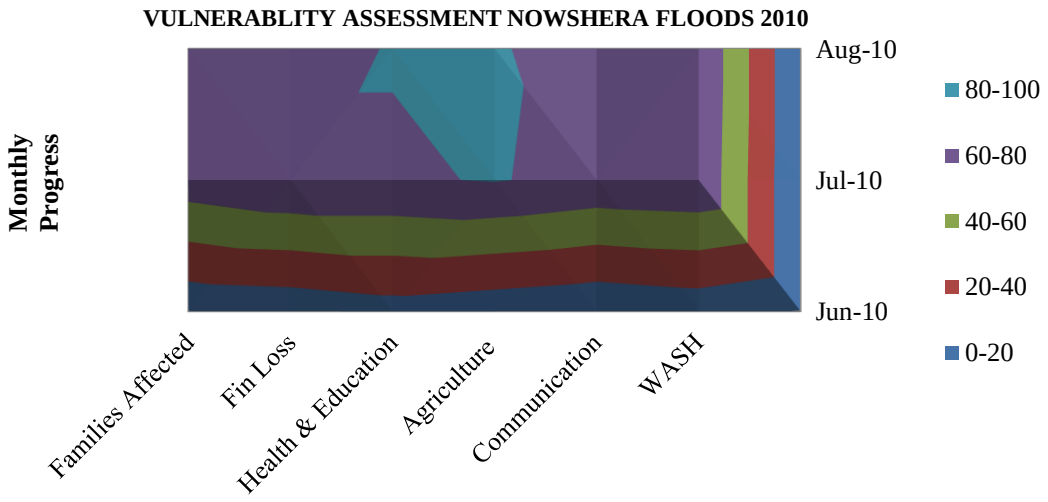


Figure 3.6 : Elements at Risk

3.9.2 Vulnerability Rating: The methodology for assessing the rating of vulnerability had been adopted from the work done by Parkash Khadka and Basanta Raj Adhikari, Department of Civil Engineering, Tribhawan University, Nepal while carrying out the Flood Vulnerability and Capacity Assessment (VCA) of people in Banke District of Nepal in November 2014. Later, the rating of vulnerability had been assigned on the criteria, as given in the table 3.3 as under:-

Ser	Reference Range	Vulnerability Rating
1	< 0.299	LOW
2	0.300 to 0.499 (Mode)	MEDIUM
3	> 0.500	HIGH

Table 3.3 : Vulnerability Rating Criteria

Vulnerability of the study area had been ranked into three classes i.e. Low, Medium and High; after having analyzed the extent of damage assessed through ground check and survey of vulnerable localities. Damage assessment had been done on the basis of an averaged aggregate (percent) of damage under each Element at Risk; having the range of seven. The resultant weight-age is summed up to the *Net Vulnerability Rating*; up to three decimal. Refer table 3.4 below:-

Ser	Elements at Risk → / UCs / Sectors (Village/s) ↓	Human Life Loss	Families Affected	Fin Loss	Health & Edu Loss	Agri Infra	Comm Infra	WASH (Water & Sanitation Hygiene)	Net Weight -age	Vuln Rating
1	Abazawal Kouruna	0.000	0.088	0.071	0.089	0.086	0.093	0.090	0.517	HIGH
2	Bella Killay (Katozai)	0.000	0.068	0.076	0.089	0.086	0.093	0.090	0.480	MEDIUM
3	Banda Sardar Ghaiba	0.035	0.078	0.078	0.089	0.086	0.093	0.090	0.549	HIGH
4	Banda Sheikh Ismail	0.070	0.090	0.085	0.000	0.086	0.093	0.090	0.514	HIGH
5	Cheena & Mirza Dher	0.000	0.090	0.080	0.072	0.043	0.046	0.090	0.421	MEDIUM
6	Chowki Town Complex	0.000	0.039	0.050	0.044	0.086	0.046	0.045	0.310	MEDIUM
7	Dheri Katti Khel Complex	0.000	0.048	0.050	0.044	0.086	0.046	0.045	0.319	MEDIUM
8	Dagi Mukarram Khan	0.000	0.009	0.044	0.044	0.064	0.023	0.068	0.252	LOW
9	Dildar Gharia	0.000	0.090	0.085	0.089	0.008	0.093	0.090	0.455	MEDIUM
10	Fatma Khel	0.000	0.061	0.068	0.089	0.043	0.093	0.090	0.444	MEDIUM
11	Hadzai	0.000	0.051	0.063	0.089	0.043	0.093	0.090	0.429	MEDIUM
12	Rajar Complex	0.000	0.068	0.078	0.089	0.043	0.093	0.081	0.452	MEDIUM
13	Mistri Banda	0.035	0.090	0.085	0.072	0.086	0.093	0.090	0.511	HIGH
14	Mahajar Camp (Utmanzai)	0.000	0.094	0.087	0.089	0.086	0.093	0.090	0.539	HIGH
15	Munda Head (Katozai)	0.000	0.094	0.087	0.089	0.086	0.093	0.068	0.517	HIGH
16	Misssri Banda (Pir Sabak, Mian Killi & Zara Miana)	0.105	0.094	0.087	0.072	0.086	0.093	0.090	0.627	HIGH
17	Mirza Dher Complex	0.000	0.090	0.086	0.089	0.008	0.093	0.090	0.456	MEDIUM
18	Nowshera Cantt Complex	0.070	0.037	0.041	0.044	0.086	0.046	0.045	0.369	MEDIUM
19	Nowshera Qallah Complex	0.035	0.031	0.037	0.044	0.086	0.046	0.045	0.324	MEDIUM
20	Nisata & Kheshgi Complex	0.070	0.090	0.084	0.089	0.086	0.093	0.068	0.580	HIGH
21	Pareech Payan & Utmanzai	0.000	0.042	0.042	0.044	0.043	0.046	0.045	0.262	LOW
22	Qamar Killi (Sadar Glara)	0.000	0.090	0.085	0.089	0.086	0.093	0.068	0.511	HIGH
23	Shinkai &Umerzai Complex	0.000	0.051	0.070	0.089	0.043	0.070	0.068	0.391	MEDIUM
24	Salar Zai & Rajar Complex	0.000	0.051	0.043	0.089	0.043	0.093	0.045	0.364	MEDIUM
25	Sadar Ghana	0.000	0.090	0.085	0.089	0.086	0.093	0.068	0.511	HIGH
26	Salgaro & Katozai	0.000	0.095	0.087	0.089	0.086	0.093	0.090	0.540	HIGH
27	Tarnab Complex (NIFA)	0.000	0.045	0.045	0.044	0.043	0.046	0.045	0.268	LOW

Table 3.4: Elements at Risk vs Vulnerability Rating of Study area

3.9.3 Vulnerable Groups Identification: Demographic details constructing the socioeconomic characteristics of vulnerability pertaining to the people of study area were first collected through the information acquired during the questionnaires circulated (Refer to the CPL-C questionnaire at Annexure A) via

house hold survey and interviews. Mean social indicators of vulnerability were extracted from the demographic information / details, analyzed and then set as *Key Parameters.* These included the respondent's age, their gender, profession/ income, house status and caste / sub-caste etc. How these positively or negatively influenced the socioeconomic constructs of vulnerability is illustrated in the table 3.6 below. While carrying out the rating of vulnerability, it was observed that the vulnerable groups duly identified were indexed as under:-

Ser	Vulnerability Rating	Vulnerable Groups	Frequency Distribution
1	LOW	03	11.12%
2	MEDIUM	13	48.14%
3	HIGH	11	40.74%
	Total Groups	**27**	**100%**

Table 3.5: Frequency of Vulnerable Groups Identified

It is evident from the above table that level of Medium Vulnerability was the highest (48.14%) as compared to Highly Vulnerable zone (40.74%) and Low Vulnerable zone (11.12%). Highly vulnerable zone was much closer to the River Kabul routine course with regards to the regions of medium and low vulnerability.

Ser	Key Parameters	Portrayal	Influence (+ve/-ve)
1	Age	• How it affects evacuation short before or during the flood when it strikes? • The children and elderly require help	○ Children (+vely) ○ Elderly (+vely)
2	Gender	• How it affects evacuation and recovery from flood disaster? • Women (pregnant or menstrual) often require help from men for evacuation to the shelters.	○ Women (+vely) ○ Men (-vely)
3	Profession / Income	• How it affects livelihood from flood disaster? • Direct profession or income resources are more affected than indirect ones.	○ Agriculture (+vely) ○ Livestock (+vely) ○ Sharecropper (+vely) ○ Shopkeepers (-vely) ○ Rentals (-vely) ○ Salaried (-vely) ○ Daily wage (-vely)
4	House Status	• How it affects quality of construction / make and type of house? • Bricked or cemented houses are more secure than the mud houses.	○ Mud (+vely) ○ Bricked (-vely) ○ Cemented (-vely) ○ Tents (-vely) ○ Shelters (-vely)
5	Caste/Subcaste	• How it affects access to resources? • High Castes i.e, Khattak, Gumoriani, Kheshgi Batakzai, Kakakhel, Babar ,Awan, Paracha, Afridis, Tiazi have preference over the other low sub-castes (work/laborer)	○ High Castes (+vely) ○ Low Castes (-vely)

Table 3.6 : Influence of Key Parameters on Vulnerability

PART- III : IMPACT ANALYSIS OF PTSD ON THE VULNERABLE GROUPS

3.10 General

To achieve its objective, research was accomplished in two steps. Pilot study was conducted as a 1st step to check the consistency of the instruments used and to find out whether there was any need for change(s) in the instruments or not? The main study was carried out in second step. This part presents the methodology adopted for investigating the impact of relationship of flood related PTSD upon the vulnerability of victims (vulnerable groups) exposed to Nowshera Floods in 2010.

3.11 Population. Vulnerable zone comprising 27 villages / sectors as explained at table 3.4 above.

3.12 Pilot Study

3.12.1 Objectives: Following objectives were predestined in the pilot study:-

i. To check reliability of the instruments for measurement of flood related PTSD with regards to the vulnerability of victims (vulnerable groups) exposed to Nowshera Floods in 2010

ii. To improve the data collection technique i.e. questionnaire, (if needed) by making necessary changes in the questions asked i.e. rephrasing of item(s) in order to transform into more easy and comprehend-able form.

3.12.2 Data Collection and Sampling: The data collection instrument used was "questionnaire" while a sample of 100 flood victims was collected from five villages / sectors (out of 27) that had all type of vulnerability levels. Ten of them did not respond, however 90 responded (response rate 90%). The details as under:-

Ser	Village / Sector	Vuln Rating	Frequency	Percent
1	Banda Shiekh Ismail	HIGH	17	18.89
2	Dheri Katti Khel Complex	MEDIUM	19	21.12
3	Mistri Banda	HIGH	16	17.77
4	Pareech Payan & Utmanzai	LOW	20	22.22
5	Salgaro & Katozai	HIGH	18	20.00
-	**TOTAL**	**-**	**90**	**100**

Table 3.7 : Pilot Study Sample

Sample was drawn in two stages. In the first stage, simple random sampling technique was used to select only five villages out of pure twenty seven vulnerable villages in the area of study from District Nowshera of KPK. Then, convenient sampling method was adopted to select only ninety flood affectees. The details as under:-

Ser	AGE GROUPS	AGE DISTRIBUTION		GENDER DISTRIBUTION			
		Frequency	Percent	Male	Percent	Female	Percent
1	7 to 18 Years	35	38.90	16	17.78	19	21.12
2	19 to 39Years	34	37.77	18	20.00	16	17.77
3	40 to 59Years	18	20.00	08	08.89	10	11.11
4	≥ 60 Years	03	03.33	02	02.22	01	01.11
5	**TOTAL**	**90**	**100**	**44**	**48.89**	**46**	**51.11**
6	**Illiterate**	**38**	**42.22**	**25**	**27.77**	**13**	**14.44**
7	**MS (Single)**	**54**	**60.00**	**24**	**26.66**	**30**	**33.33**

Table 3.8 : Age and Gender Distribution vs Literacy Rate & Marital status

In the above table, there are four groups of respondents from serial 1 to 4 and their mean age is 22.5 years out of which 48.89% are males and 51.11% females. 60% are singles out of which 26.66% are males and 33.33% females. 42.22% are illiterate with the distribution of 27.77% males and only 14.44% females.

Questionnaires were administered personally with the help of few educated friends and accomplices from Nowshera Cantonment; for the author had an advantage of residing here for quite a long time. The distributed questionnaires were collected after two days break so that the questionnaire could be got filled conveniently by the selected respondents. All questionnaires were returned with the response rate of 100%. Out of those 90 questionnaires, a pilot study was conducted to check the reliability co-efficient (Cronbach Alpha) for such dimensions of PTSD that included Upsetting Thoughts, Flashbacks, Troubling Environmental Stimuli (olfactory, auditory or visual), Self Detachment (Isolation), Others Detachment, Fear of Foreshortened Future, Survival Guilt,

Insomnia (Sleeplessness), Mood Swings, Anger Outbursts, Cognitive/Memory Impairment, Excessive Vigilance and Hyper-arousal (which had range from 0.60 to 0.078) as against seven approaches to Elements at Risk counting on Vulnerability of identified groups i.e. Human life loss (deaths), Families Affected, Financial Loss, loss of Health and Education Facilities, loss of Agricultural Infrastructure, loss of Communication Infrastructure and the loss of Water & Sanitation Hygiene (WASH). This had range from 0.65 to 0.78. Some minor changes were also incorporated in the P- Items of questionnaire i.e. few questions statement was made clearer; before going for main study.

3.13 Main Study

3.13.1 Demographics

Iacoviello and Charney (2014) studied that the psychosocial factors are linked with resilience among the adults where as Marina Bar Shai and Ehud Klein, (2015) in their article *"Vulnerability to PTSD: Psychosocial and Demographic Risk and Resilience Factor (January, 2015)* studied that after a traumatic experience; the risk of PTSD development depends on several factors of vulnerability including the demographics and degree of resilience. Therefore, acquiring the demographic details of respondents e.g. their age, gender, marital status, education level (illiteracy factor), coping capacity and earning level etc that will have direct bearing on the constructs of measuring the PTSD levels with regards to their vulnerability; were considered and obtained. In addition, the author visited Psychiatric Departments of DHQ Hospital and CMH Nowshera to determine the frequency of psychosocial disorders. Interestingly, no data could be gathered from DHQ Hospital however, at CMH Nowshera, a Captain (female) was also deputed there as in charge Psychology Sub-department. Among the reported cases, 22 % pertained to attempting suicide, anxiety, depression and severe depression where as remaining 78% were concerning other disorders like

hypomania, schizophrenia and Bipolar Effective Disorder (BED). Some of interesting data collected is as under since flood 2010 which shows an average increase of 6.84 % per annum (p.a) :-

Ser	Year	Patients Indoor	Patients Outdoor	Total	Change % (+/-) p.a.	
1	2010	60	4320	4380	Standard *	* an average increase of 6.84 % pa
2	2011	72	5040	5112	16.65 % (+)	
3	2012	96	5328	5424	06.10 % (+)	
4	2013	12	5760	5772	06.41 % (+)	
5	2014	144	6048	6154	06.61 % (+)	
6	2015	156	6145	6301	02.38 % (+)	
7	2016	168	6768	6936	10.07 % (+)	
8	2017	192	7200	7392	06.57 % (+)	

Table 3.9 : Data of Psychology Related Cases ex CMH Nowshera

Later, the data concerning the earning levels (in terms of income) and the coping capacity (in terms of various savings) of flood victims was also obtained and evaluated for rating criteria as under in consultation with DDMU Nowshera:-

Ser	Earning Level	Coping Capacity
1	≥ Rs. 150,000.00	≥ Rs. 2500,000.00
2	≥ Rs. 100,000.00	≥ Rs. 1500,000.00
3	≤ Rs. 50,000.00	≤ Rs. 500,000.00

Table 3.10 : Criteria for Earning Levels & Coping Capacity

After that, the above criteria were assigned weight-ages in order to draw the respective rating through standard deviation for Earning Level and Coping Capacity of the respondents. Results obtained were as under:-

Ser	Earning Lvl %	Weight-age	Coping Cap %	Weight-age	Net Weight-age	Rating (SD)
1	50	0.010	55.55	0.011	0.021	HIGH
2	33.33	0 .006	33.33	0.006	0.013	MEDIUM
3	16.66	0.003	11.11	0.002	0.005	LOW
-	100	-	100	A/ Mean	0.013	-

Table 3.11 : Evaluation of Rating for Earning Levels & Coping Capacity

These details highlighting the comparison of rating among the three factors i.e. vulnerability, earning level and the coping capacity were then translated duly as under for the complete population:-

Ser	Village / Sectors	Vuln Rating	Earning Lvl	Coping Capacity
1	Abazawal Kouruna	HIGH	LOW	LOW
2	Bella Killay (Katozai)	MEDIUM	MEDIUM	LOW
3	Banda Sardar Ghaiba	HIGH	LOW	LOW
4	Banda Sheikh Ismail	HIGH	LOW	LOW
5	Cheena & Mirza Dher	MEDIUM	LOW	MEDIUM
6	Chowki Town Complex	MEDIUM	HUGH	LOW
7	Dheri Katti Khel Complex	MEDIUM	HIGH	MEDIUM
8	Dagi Mukarram Khan	LOW	HIGH	HIGH
9	Dildar Gharia	MEDIUM	LOW	MEDIUM
10	Fatma Khel	MEDIUM	LOW	HUGH
11	Hadzai	MEDIUM	HIGH	MEDIUM
12	Rajar Complex	MEDIUM	HIGH	MEDIUM
13	Mistri Banda	HIGH	LOW	LOW
14	Mahajar Camp (Utmanzai)	HIGH	LOW	LOW
15	Munda Head (Katozai)	HIGH	LOW	LOW
16	Pir Sabak, Mian Killi & Zara Miana	HIGH	LOW	LOW
17	Mirza Dher Complex	MEDIUM	LOW	MEDIUM
18	Nowshera Cantt Complex	MEDIUM	LOW	HUGH
19	Nowshera Qallah Complex	MEDIUM	HIGH	MEDIUM
20	Nisata & Kheshgi Complex	HIGH	LOW	LOW
21	Pareech Payan & Utmanzai	LOW	HIGH	HIGH
22	Qamar Killi (Sadar Glara)	HIGH	LOW	LOW
23	Shinkai &Umerzai Complex	MEDIUM	LOW	MEDIUM
24	Salar Zai & Rajar Complex	MEDIUM	LOW	HUGH
25	Sadar Ghana	HIGH	LOW	LOW
26	Salgaro & Katozai	HIGH	LOW	LOW
27	Tarnab Complex (NIFA)	LOW	HIGH	HIGH

Table 3.12 : Rating of Vulnerability vs Earning Levels & Coping Capacity

From the above table, it can also be concluded that Vulnerability was inversely proportional to the Earning Level and Coping Capacity meaning thereby lesser the Earning Level and/or Coping Capacity ; higher will be Vulnerability and vice versa.

3.13.2 Data Collection and Sampling

For main study, sample was drawn in two stages. In the first stage, simple random sampling technique was used and then, convenient sampling method was adopted to accrue a sample of 396 vulnerable victims (at an average of 18 respondents as evaluated in the pilot study) of flood from all segments of population selected to see diverse patterns of behavior of Flood PTSD on their Vulnerability. For this purpose, a set of 396 questionnaires were distributed among the respondents out of which 350 were returned at a response rate of 88.38 % at the rate of an average no. of 16 respondents per sector. Details as under:-

Ser	AGE GROUPS	AGE DISTRIBUTION		GENDER DISTRIBUTION			
		Frequency	Percent	Male	Percent	Female	Percent
1	7 to 18 Years	138	39.42	64	18.28	74	21.15
2	19 to 39Years	121	34.57	72	20.57	49	14.00
3	40 to 59Years	78	22.28	32	09.14	46	13.15
4	≥ 60 Years	13	03.73	08	02.28	05	01.43
5	**TOTAL**	**350**	**100**	**176**	**50.27**	**174**	**49.73**
6	**Illiterate**	**152**	**43.42**	**97**	**27.71**	**55**	**15.71**
7	**MS (Single)**	**215**	**61.42**	**95**	**27.14**	**120**	**34.28**

Table 3.13 : Age and Gender Distribution vs Literacy Rate & Marital status

In the above table, there are four groups of respondents from serial 1 to 4. Maximum no. is 138 in the teenage group, 121 in the twenty thirties, 78 in the forty fifties where as old folk is 13 only. In the total sample of 350, 50.27% are males and 49.73% females. 215 (61.42%) are singles out of which 27.14% are

males and 34.28% females. 152 (43.42%) are illiterate with the distribution of 27.71% males and only 15.71% females. This data is interesting too in a sense that literacy rate is higher in females with rising trend of being unmarried.

3.13.3 Questionnaire

Questionnaire of this study is based upon common assessment measures duly adopted from the "PTSD Checklist" provided by various researchers of American National Center for PTSD, Boston, USA (2007). It is comprised of four sections including a title / cover page which explains the vital idea of introduction of research. First section was related to various constructs or dimensions of PTSD. In second section, there was a single question to measure the level of Flood PTSD penetration in the personality of Pakistani flood victims. The third section pertains to measure the vulnerability level which mostly describes the impact of elements at risk. Fourth section pertains to demographic details. The sample questionnaire is given at Annexure A of this document.

3.13.4 PTSD Constructs and Vulnerability Variable

It is a 25 items questionnaire designed to test the relationship of Flood PTSD with the Vulnerability of flood victims in Nowshera District of Pakistan. First set of seventeen questions are there for assessing the big four traits of PTSD namely ***Event Re-experiencing*** (i.e. intrusive thoughts, recollections and / or recurrent dreams), ***Avoidance Behavior*** (i.e. avoiding activities, situations, people, and/or conversations associated with the trauma), ***General Numbness*** (i.e. loss of interest in surroundings and detachments), and ***Hypersensitivity*** (i.e. inability to sleep, anxious feelings, overactive, startled response, hyper vigilance, irritability and anger outbursts). Eighteenth question is the confirmatory test of PTSD case or no PTSD case based on the assessment of initial seventeen questions. Last seven questions of the Questionnaire test the vulnerability of flood victims.

In the Flood PTSD questionnaire containing 17 questions, the respondents used a five point Linkert type scale to rate each statement, ranging from one to five expressing; 1: not at all, 2: a little bit, 3: Moderately, 4: quite a bit and 5: extremely. Eighteenth question just marks answer as Yes or No where as the seven questions is related to the Vulnerability of Flood Victims range from 1 (strongly Disagree) to 5 (strongly Agree) vide John & Srivastava (1999).

3.13.5 Procedure

Various friends and associates from Nowshera City were approached. They were briefed about the purpose and mode of study. Permission was then taken verbally from DCO as well as DPO Nowshera. In case of any difficulty, DPO Nowshera assured of his fullest cooperation. Mr.Gundapur Superintendent of Police (Rural) as well as Station House Officer Nowshera Cantonment (Inspector Naseem) provided an adequate support. There was no obstruction. Respective respondents also cooperated very well. A total no. of 396 questionnaires were distributed personally. The respondents were also briefed about the study and its objectives. They were also ensured that the data will be used purely for the academic research purpose and also that the confidentially of the data will be preserved at all costs. The questionnaires were collected after two days break so that the questionnaire are get filled (by the helpers from the respondents) with ease and élan. They were also asked for their feedback on the account' whether the questionnaire was easy to understand and comprehend or otherwise? Was there any item(s) which needed changes or corrections? At the end, the data was collected, coded and entered in Microsoft Excel sheet. Later it was transferred to the SPSS file. Feedback of the pilot study was also recorded in Microsoft World document. A code log was also generated for the ease in analysis. After coding, variables were defined, calculated and coded too.

3.13.6 Result and Conclusion of the Main Study

To meet the two objective of main study, the data was obtained for analysis of the questionnaires and also to solicit the feedback of the respondents. First the *Reliability of the Instrument* was analyzed using Cronbach Alpha i.e.

Coefficient of Reliability (Cronbach, 1951). According to George & Mallery (2003), the value of Cronbach in the range $0.8 > \alpha > 0.7$ is desirable and it did show that the instrument is internally consistent and is reliable for measuring the concepts. Following are the "α" value of the variables used in the pilot study:-

Ser	Instrument/ Variables (4+1)	No. of items	Cronbach Alpha ($0.8 > \alpha > 0.7$)
1	Event Re-experiencing	05 (1 to 5)	0.776
2	Avoidance Behavior	03 (6 to 8)	0.725
3	General Numbness	03 (9 to 11)	0.745
4	Hypersensitivity	06 (12 to 17)	0.691
5	**Vulnerability**	**07 (18 to 24)**	**0.710**

Table No. 3.14 : Cronbach Alpha Values of the Instrument

[Note: Sources of primary data, collected by Author]

For achieving the second objective of the pilot study, the feedback of the respondent was analyzed. They suggested rephrasing of some of the items and replacement of few words with easy to understand the words.

3.13.7 Research Questions (RQs)

To achieve the 2nd objective of the study; following research questions were developed:-

i. ***Q1***: What is the overall personality orientation towards the Flood related PTSD and also to inquire about the symptoms of PTSD in all the target respondents?

ii. ***Q2:*** How Flood related PTSD is associated with the Vulnerability of flood victims?

iii. ***Q3:*** How Flood related PTSD dimensions or constructs affect the Vulnerability of flood victims?

iv. ***Q4:*** Are there any positive cases of PTSD inflicted flood victims? If yes, how much percent?

3.13.8 Development of Hypothesis

Getting support from literature presented and elaborated information, deductive approach was used. Following hypothesis were formulated to answer the deduced research question (RQs) stated above.

H1: ***Event Re-experiencing*** (ERE) will be positively correlated with the Vulnerability.

H2: ***Avoidance Behavior*** (AB) will be positively correlated with the Vulnerability.

H3: ***General Numbness*** (GN) will be positively correlated with the Vulnerability.

H4: ***Hypersensitivity*** (Hyper) will be positively correlated with the Vulnerability.

3.13.9 Statistical Tool and Techniques

For the analysis of the collected data, statistical tools used are those pertaining to descriptive statistics i.e. means, modes, standard deviation and frequencies tables, Pearson Correlation, reliability analysis and regression analysis. SPSS version 21 and MS 2007 software were used for data analysis.

3.13.10 Conceptual Frame Work Model

In the light of previous discussion and development propositions, following conceptual model is suggested by the author representing the relationship between Flood related PTSD with the Vulnerability of flood victims:-

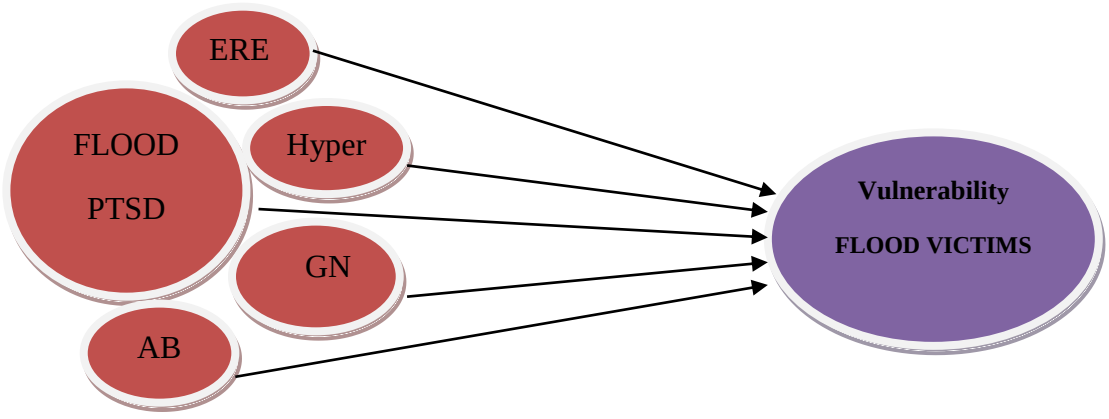


Figure 3.7 : Conceptual Framework Model for Flood Victims

Chapter-4

DISCUSSION ON RESULTS

4.1 Introduction

In this chapter, the result of detailed statistical analysis of the researched data will be presented and discussed. The statistical tools and techniques used in this research include reliability analysis (Cronbach Alpha), Descriptive Statistics, Pearson Correlation, Regression Analysis and Analysis of Variance (ANOVA) etc.

4.2 Reliability Analysis of the Measures

In this analysis, two main constructs with four sub-constructs were used. First the reliability of the instrument was analyzed using Cronbach alpha, coefficient of reliability (Cronbach, 1951). According to George & Mallery (2003), the value of Cronbach Alfa was found in the range $0.8 > \alpha > 0.7$ i.e. desirable and it did show that instrument is internally consistent and is reliable for measuring the concepts. The Cronbach Alpha (α) values ranged from 0.69 to 0.80. (See table 4.1 below)

Ser	Instrument/ Variables (4+1)	No. of items	Cronbach Alpha ($0.8 > \alpha > 0.7$)
1	Event Re-experiencing	05 (1 to 5)	0.776
2	Avoidance Behavior	03 (6 to 8)	0.725
3	General Numbness	03 (9 to 11)	0.745
4	Hypersensitivity	06 (12 to 17)	0.691
5	**Vulnerability**	**07 (18 to 24)**	**0.710**

Table No. 4.1: Cronbach Alpha Values of the Instrument

4.3 Descriptive Statistics of the Sample

General descriptive statistics and other demographic details are given in the tables underneath:-

4.3.1 Statistics Table

Vulnerability is the dependent variable where as Event Re- Experiencing (ERE), Avoidance Behavior (AB), General Numbness (GN) and Hypersensitivity (Hyper) are independent variables related to PTSD where as "Anyone" is the discrete variable. Following table depicts the mean, mode, median and the standard deviation of the data used:-

	N	Age	Gender	Anyone	ERE	AB	GN	Hyper	Vuln
Valid N	350	350	350	350	350	350	350	350	350
Missing	0	0	0	0	0	0	0	0	0
Mean	0	4.11	1.63	1.71	1.59	1.61	1.64	1.64	1.53
Median	-	4.00	1.68	2.00	1.40	1.25	1.33	1.67	1.40
Mode	-	4	2	2	1	1	1	2	1
Standard Deviation	-	.317	.487	.454	.687	.830	.778	.488	.365

Table 4.2: Statistics; Mean, Mode, Median & Standard Deviation

4.3.2 Age & Frequency Table

Following table shows the age groups and the frequency (%) of respondents in the shape of no. of flood victims who suffered in floods 2010 registered in the survey area.

Ser	AGE GROUPS	AGE DISTRIBUTION		
		Frequency	Percent	Rating
1	7 to 18 Years	138	39.42	1
2	19 to 39Years	121	34.57	2
3	40 to 59Years	78	22.28	3
4	≥ 60 Years	13	03.73	4
5	**TOTAL**	**350**	**100**	**-**

Table 4.3 : Age and Frequency Distribution

In the above table, there are four groups of respondents from serial 1 to 4. Maximum no. is 138 in the teenage group (39.42%), 121 in the twenty thirties (34.57%), 78 in the forty fifties (22.285%) where as old folk is 13 (03.73%) only.

4.3.3 Frequency of PTSD Affected Respondents

As seen in the table 4.2 above, no. of respondents [n=350] is given by Valid N whose mean (M) is given at "Anyone" i.e. human being; by (M= 1.71) followed by Event Re-Experiencing (M=1.59), Avoidance Behavior (M=1.61), General Numbness (1.64) and Hypersensitivity (M= 1.64) thus affecting the overall Vulnerability (M=1.53). Data analysis at table 4.4 below shows that 101 respondents (28.85%) out of total 350 (100%) were high (+ve) on the PTSD.

PTSD Affected Respondents		Frequency	Distribution %
Valid	Yes	101	28.85
	No	249	71.15
	Total	350	100

Table No. 4.4: PTSD Affected Respondents

4.3.4 Frequency of Direct Flooding Experience

Flooding experience results are tabulated below:-

Ser	Flooding Experience of Victims	DISTRIBUTION		
		Frequency	Percent	Rating
1	Physical Injury	53	15.14	3
2	Exposed to Flood for one day	104	29.71	2
3	Exposed to Flood for two days	29	08.28	4
4	Exposed to Flood for three days	201	57.42	1
5	Exposed to Flood for over three days	16	04.58	5

Table 4.5: Direct Flooding Experience

Above table 4.5 explains that physical injury was experienced during the flood by 53 victims (15.14 %) where as 104 (29.71 %) who got exposed to floods for one day and 29 (8.28%) were exposed for two days, 201 (57.42%) were

exposed for three days and 16 (4.58%) of the respondents were respectively exposed for more than three days.

4.3.5 PTSD Analysis Scale

This scale was used to carry out the PTSD analysis of flood victims for the level of their stress with regards to their no. and age groups. The details as under:-

a. **Stress Level**: The outcome is given at the following pie chart. Out of 101 PTSD affected victims, 70.40% had moderate level, 17.72 % had mild level where as 11.80% had sever level of PTSD.

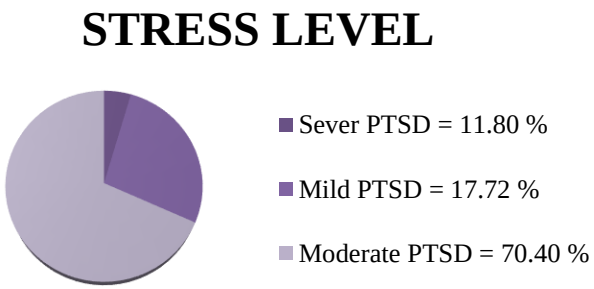


Figure 4.1: Stress Levels of PTSD

b. **Age:** Conversely, the age of respondents was inversely proportional to the level of PTSD i.e. the youngest teenage group (7-18 years) had highest level of PTSD when compared with other higher age groups. This is shown as under:-

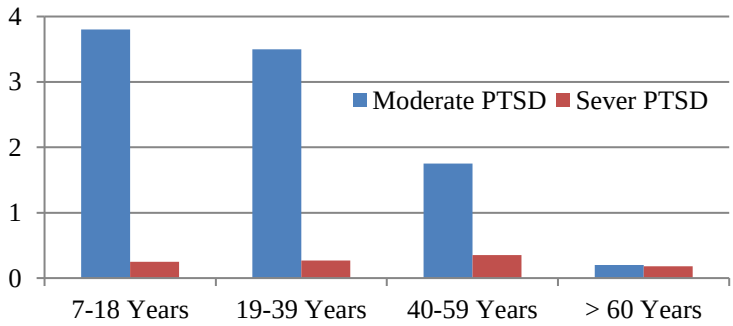


Figure 4.2 : Age Groups vs Level of PTSD

4.3.5 Chi-square Test Results

This statistical procedure determines the "*Goodness of Fit*" between a set of observed values and the ones which are expected theoretically. Few of the interesting results are as under with regards to gender, education level, marital status, earning lost and the duration exposed to the flood disaster:-

a. **Gender, Education Level and Marital Status**: An insignificant relationship exists between gender and education level with PTSD which means that the Nowshera Flood Disaster 2010 did not discriminate gender and education level as well. However, Chi-Square Test (0.001) value shows a positive correlation between marital status (M) and PTSD i.e. singles were little affected than couples.

b. **Earning Lost**: It is directly proportional to develop PTSD symptoms. More earning lost has good chances of developing PTSD because positive significant correlation exists between PTSD development and the earning lost as indicated by Chi-Square Test value (0.015). Earning lost @ ≤ Rs. 50,000/- were more affected than the other higher groups. Details as under:-

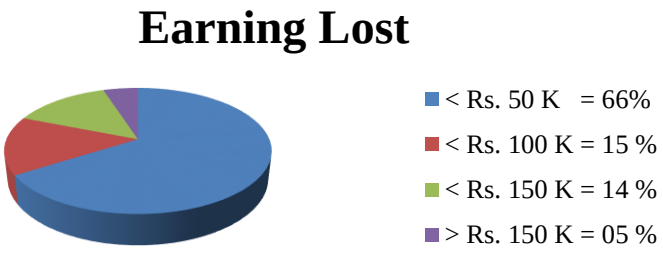


Figure 4.3: Earning Lost vs Level of PTSD

c. **Time Duration:** Chi-Square Test value (0.000) finds a highly significant correlation between levels of PTSD and the time duration exposed. Respondents faced up with more time exposed to the flood disaster had more chances to erupt sever form of PTSD.

4.4 Correlation Analysis

Table 4.6 below shows correlation between PTSD and Vulnerability. Since the correlation coefficients values are less than 0.90, which indicate that the data has not been affected by co-linearity problem; Hair et al' (2006). The relationship between Event Re-experiencing and Avoidance Behavior with Vulnerability is positive but not significant. (r = .84, p > 0.01 & r = .77 p > 0.01) where as the relationship between General Numbness and Hypersensitivity with Vulnerability is positively significant (r = .66, p < 0.01 and r = .80 p < 0.01 respectively). The overall ***relationship between PTSD and Vulnerability is positively significant*** (r = .84, p < 0.01).

		Age	Gender	ERE	AB	GN	Hyper	Vuln	PTSD
	Pearson Correlation	1							
Age	Sig. (2-tailed)								
	N	350							
	Pearson Correlation	.							
Gender	Sig. (2-tailed)	.000	1						
	N	350	350						
	Pearson Correlation	.214	.211·	1					
ERE	Sig. (2-tailed)	.050	.051						
	N	350	350	350					
	Pearson Correlation	.097	.096	.646**	1				
AB	Sig. (2-tailed)	.380	.378	.000					
	N	350	350	350	350				
	Pearson Correlation	.171	.169·	.330**	.415**	1			
GN	Sig. (2-tailed)	.120	.119	.002	.000				
	N	350	350	350	350	350			
	Pearson Correlation	.179	.178	.522**	.471**	.508**	1		
Hyper	Sig. (2-tailed)	.103	.101	.000	.000	.000			
	N	350	350	350	350	350	350		
	Pearson Correlation	.010	.009	.104	.157	.302**	.391**	1	
Vuln	**Sig. (2-tailed)**	**.929**	**.923**	**.346**	**.153**	**.005**	**.000**		
	N	**350**	**350**	**350**	**350**	**350**	**350**	**350**	
	Pearson Correlation	**.224***	**.223***	**.851****	**.770****	**.669****	**.804****	**.281****	
PTSD	**Sig. (2-tailed)**	**.040**	**.000**	**.000**	**.000**	**.000**	**.000**	**.010**	
	N	**350**	**350**	**350**	**350**	**350**	**350**	**350**	**350**

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table 4.6 : Correlation Analysis

4.5 Regression Analysis

Regression analysis was performed for analyzing whether PTSD as well as its components are significant predictors of vulnerability of flood victims or otherwise. So, the Table 4.7 below shows the Regression Analysis between PTSD and Vulnerability.

Dependent Variable	**VULNERABILITY**			
Independent Variable	**Un-standardized Coefficients**		**t**	**P Value**
	β	**Std. Error**		
(Constant)	1.059	.133	7.938	.000
ERE	-.084	.075	-1.121	.266
AB	.006	.061	.091	.928
GN	.071	.057	1.239	.219
Hyper	.293	.099	2.966	.004
PTSD	.195	.074	2.655	.010
R Square	**.18**			
PTSD and R square	**.079**			
F Value	**4.451**			**.003[b]**

Table 4.7: Regression Analysis between PTSD and Vulnerability

4.6 Model Summary

Following Table 4.8 shows "R Square" which means that 18 % change (.184) in the vulnerability of flood victims has been affected due to PTSD.

Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.429[a]	.184	.143	.338
a. Predictors: (Constant), Hyper, AB, GN, ERE				

Table 4.8: Model Summary

4.7 Analysis of Variance (ANOVA)

Following two tables (4.9 A & B) indicate towards the *"Overall Model Fit"* as represented by the respective significance level ($p < 0.05$) in both the cases.

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Valid	Regression	2.038	4	.509	4.451	.003[b]
	Residual	9.042	79	.114		
	Total	11.080	83			
a. Dependent Variable: Vulnerability						
b. Predictors: (Constant), Hyper, AB, GN, ERE						

Table 4.9 A: Analysis of Variance (ANOVA) - FACTORS

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	.877	1	.877	7.051	.010[b]
	Residual	10.202	82	.124		
	Total	11.080	83			
a. Dependent Variable: Vulnerability						
b. Predictors: (Constant), PTSD						

Table 4.9 B: Analysis of Variance (ANOVA) - PTSD

4.8 Hypothesis Analysis

4.8.1 Hypothesis H1

First hypothesis "H 1" hypothesized that Event Re Experiencing will be positively correlated with the Vulnerability. The correlation analysis of Event Re-Experiencing (ERE) with Vulnerability did not

support H1 because r = 0.85, p > 0.01 and R square (R^2) (about Vulnerability) is 0.18 which means that 18 percent of the variation in the dependent variable (Vulnerability) is being explained by the independent variable (Event Re-Experiencing). Negative Beta (β) value (-0.084) says that if there is one unit change in independent variable, then dependent variable will change by -.084 units. Negative β (Beta) value exhibits that Event Re-Experiencing (ERE) is negatively related with Vulnerability, therefore H1 is rejected.

4.8.2 Hypothesis H2

Second hypothesis "H 2" hypothesized that *Avoidance Behavior* (AB) will be positively correlated with the Vulnerability. The correlation analysis of ***Avoidance Behavior*** (AB) with Vulnerability did not support H2 because r = 0.77, p > 0.01 and R Square (R^2), (about Vulnerability) is 0.18 which means that 18 percent of the variation in the dependent variables (Vulnerability) is being explained by the independent variable Beta (β) values is 0.006 (positive), which says that if there is one unit change in independent variable *(Avoidance Behavior),* then dependent variable will change by 0.006 units. Though the positive β (Beta) value exhibits that *Avoidance Behavior* (AB) is positively related with the Vulnerability, but its more P value rejected H2 (0.153 > 0.01)

4.8.3 Hypothesis H3

Third hypothesis "3 H" of the study was that *General Numbness* GN will be positively correlated with the Vulnerability. Correlation analysis of *General Numbness* (GN) and Vulnerability supports H3 because r = .66, p < 0.01 and R Square (R^2), (about Vulnerability) is 0.18 which means that 18 percent of the changes in the dependent variables (vulnerability) can be explained by variation in the independent variable (GN). Beta (β) value is 0.071 and p < 0.01 which says that if there is one unit change in independent variable, then dependent variable will change

by 0.071 units. Beta value is positive which exhibited that GN is positively related with Vulnerability. Therefore, H3 is accepted.

4.8.4 Hypothesis H4

Fourth hypothesis "4 H" was that Hypersensitivity will be positively correlated with the Vulnerability. Correlation analysis of Hypersensitivity and Vulnerability supports H4 because $r = 0.80$, $p < 0.01$ and R Square (R^2) is about 0.18 (concerning Vulnerability) which means that 18 percent of the changes in the dependent variables (Vulnerability) can be explained by variation in the independent variable (Hypersensitivity). Beta (β) values 0.293, $p < 0.01$ shows that if there is one unit change in independent variable, then dependent variable will change by 0.293 units. Beta value is positive which exhibited that Hypersensitivity is positively related with Vulnerability. Therefore, H4 is accepted too.

4.9 Summary of Hypothesis Results: Result Summary is as under:-

Hypothesis	Statements	Result
H1	Hypothesis H1, hypothesized that Event Re-Experiencing will be positively correlated with the Vulnerability but the correlation analysis of *Event Re-Experiencing (ERE)* with Vulnerability did not shore up H1	Rejected
H2	Hypothesis H2, hypothesized that *Avoidance Behavior* (AB) will be positively correlated with the Vulnerability but the correlation analysis of Avoidance Behavior (AB) with Vulnerability did not hold H2.	Rejected
H3	Hypothesis H3, hypothesized that General Numbness (GN) will be positively correlated with the Vulnerability was found duly supported sequel to the correlation analysis of *General Numbness* (GN) and vulnerability.	Accepted
H4	Fourth hypothesis H4, proposed that Hypersensitivity will be positively correlated with the Vulnerability. The same has also been found duly supported as a result of correlation analysis of Hypersensitivity and Vulnerability**.**	Accepted

Table 4.10: Summary of Hypothesis Results

Chapter-5

CONCLUSIONS AND RECOMMENDATIONS

5.1. General

Important and significant conclusions drawn from the discussion on results is summarized below with a brief note on respective reason and/or appropriate justification:-

5.1.1 Conclusions Related to Descriptive Statistics & Demographics: Few of the pertinent conclusions are as under:-

i. **Floods, Vulnerability and PTSD :** One major conclusion of this study is that anyone (human being) who is vulnerable to flood disaster event in general and Pakistan in particular is highly exposed to the risk of developing some level of PTSD, may it be sever, mild or moderate.

ii. **Gender Discrimination:** Disasters do not discriminate gender. This has been proved in this study too. Both the male and female gender has been found on having "*No Difference*" on account of PTSD development in contrast to other studies done in the past. Post EQ 2005, in a study conducted in KPK, Pakistan; around 93% females were reported to have been developed with PTSD; Niaz U, Hassan S and Hassan M (2007).

iii. **Loss of Life (Deaths):** In the Bam EQ of Iran, 67 % among the reported were found to have been developed with PTSD symptoms who had lost their dear ones; Moreau C, Zisook S (2002). Similarly, in Mansehra District, KPK, Pakistan; 23% of the population affected were found for having been positive for PTSD incidence; Bhamani A, Sobani SA, Baqir M, Bham NS and Beg MA (2002) but in the current study, no. of deaths

were negligible (only 1.71%); yet this factor doesn't appear for having considerable upshot on PTSD development.

iv. **Earnings Lost:** Study under review shows that the population group with earning ≤ Rs. 50,000/- per month was found to have been on greater risk and vulnerability for developing PTSD symptoms than other higher groups (refer figure 4.3 above). It is perhaps with the reason that most of the population lying in the vulnerable zone is poor farmers or salaried people belonging to rural class more or less than those who hail from urban class i.e. Nowshera City. This point is in line with another research carried out in Baluchistan; Pakistan by Khan NS, Alam S, Warris SH and Mujtaba M (2007).

v. **Level of Stress:** Mostly among the respondents who had the perception that the flooding event in the Nowshera area is very sever or moderate were found to be more with PTSD symptoms than those groups considering the event as mild (refer figure 4.1 above).

vi. **Teenage Group Vulnerability :** Results of the current study put forth that the teenagers (7-18 years age) who usually are in primary / secondary school or daily wage child laborers were found to be more susceptible to PTSD development than other age groups (refer figure 4.2 above). It's perhaps due to the fact that nature of trauma they have suffered, has never been forgotten because they badly lost their books/schools, workplace and homes. It is opposite to the study undertaken in 1999 EQ "Chi-Chi" Taiwan in which it was revealed that primary school age children superseded secondary school age for having been more subjected to PTSD Vulnerability; Chen SH, Lin YH, Tseng HM, Wu YC (2002). Same was the case for Hugo Hurricane of USA.

vii. **Education Level:** Irrespective of the education level, current study did not show any difference in PTSD Vulnerability (refer paragraph 4.3.5 above) in contrast to conclusion drawn in a rural expanse of Italy six months post an earthquake in 2009; where by people who had higher education level had significant effect to PTSD level than those who were illiterate; Priebe

S, Grappasonni I, Mari M, Dewey M, Petrelli F and Costa A (2009). The reason could be that the education can cause the self counseling for limited interval but the worsening post flood relational socioeconomic environment may have deep rooted effects.

viii. **Physical Injury :** In the research under review, physical injury had little relationship (15.14 %) with the development of PTSD effects as compared to those victims who were exposed to flood disaster for three days (57.42%) having no physical injury at all (refer Table 4.5 above). Same results were seen at the rate of 37 % for KPK Floods 2012 Pakistan; Rehman S, Abbasi S and Shaukat B (2012). Probable reason for this circumstance is that the physical injury is immediately treatable where as psychosocial trauma is hidden and becomes a plausible cause to develop PTSD with greater risk of vulnerability.

5.1.2 Conclusions Related to Summary of Hypothesis Result: Following effort is made to implore various conclusions out of the summary of results for each hypothesis:-

i. **Hypothesis H1 :** First Hypothesis H1 that Event Re-Experiencing (ERE) will be positively correlated with the vulnerability; was formulated on the basis of literature appraisal in a sense that sub-variable "Event Re-Experiencing" had built-in items such as recurrent dreams, recollections and/or intrusive thoughts. The correlation analysis of *Event Re-Experiencing (ERE)* with vulnerability did not support H1 on the rationale that most of the flood victims belonging to District Nowshera had been all the way through such experiences periodically even post floods 2010 (Figure 3.2 is referred above). It did not affect them much rather made them flat to such trauma in their daily life. Other contributions i.e. motivational spirit, love for Islamic ideology as well as strong desires to recoup are also the responsible factors. An added point of significance is that the DDMU is much effective and the Kabul River course is being

canalized under fast track to harness its waters in the flood season every year.

ii. **Hypothesis H2:** Second Hypothesis H2 stated that *Avoidance Behavior* (AB) will be positively correlated with the vulnerability. It was formulated on the basis of literature appraisal that the sub-variable *Avoidance Behavior* carried along built-in items like avoiding activities, situations, people, and/or conversations was associated with the traumatic event. The correlation analysis of *Avoidance Behavior* with vulnerability did not hold H2 on the grounds that this variable is someway related to the first co-variable *Event Re-Experiencing.* Once the recurring trauma did not make the flood victims much affected then the avoidance symptoms were not created. Accordingly, this hypothesis also got rejected orderly.

iii. **Hypothesis H3 :** Third Hypothesis H3 that General Numbness (GN) will be positively correlated with vulnerability was found duly supported sequel to the correlation analysis of *General Numbness* (GN) and vulnerability for the raison d'être that items of *General Numbness* i.e. detachments and/or loss of interest in surroundings are harmonious to the vulnerability of flood victims for their protracted exposure i.e. more than seven years to disaster and its effects. In reality, these are the preliminary symptoms of PTSD torment which are registered in the current investigation too.

iv. **Hypothesis H4:** Fourth hypothesis H4 of the study proposed that Hypersensitivity (Hyper) will be positively correlated with the vulnerability. The same has been found duly supported as a result of correlation analysis of Hypersensitivity and Vulnerability on the grounds that substance of Hypersensitivity i.e. anxious feelings, overactive, inability to sleep, , hyper vigilance, startled response, anger outbursts and irritability are interconnected with the symptoms of *General Numbness* i.e. detachments and loss of interest in surroundings. It would be pertinent to mention that the *General Numbness* takes the lead to *Hypersensitivity* i.e.

detachment, isolation and loss of interest in surroundings tantamount to anxiety, sleeplessness, startled behavior, overactive, hyper vigilance, anger outbursts and irritation. In reality, it raises to the second arena of PTSD distress, supplementary to surmounting chronic or acute PTSD. We can see from the age table that mostly the victims in the sample are either children or teenage youngsters who have been established with positive preliminary PTSD. With more age, the PTSD gets to the sensitive stage from where the recuperation becomes very fervent.

Conclusion

This cram covers a brief connection of PTSD and its silhouette in the vulnerability zone of Nowshera District in the wake on floods 2010 only in a way that how Pakistani citizens take effect post a flood due to their obvious vulnerability. The newly studied relationship between PTSD and vulnerability in the disaster zone has explored a novel venue for an auxiliary research where we as a state and as a nation reside far in the rear. It also inscribes an added inquiry; shall we be able to get purged of PTSD in multiple scenarios. Well, if it sounds that we as nation have to subsist with it, we surely require exerting on it too. Pakistan's geo-strategic setting, global climate change, serious water deficit and politico-military arena tied up with socioeconomic and vested interests of offered and promising super powers advise us about our providence as a Muslim autonomous nuclear power. We need to jolt our heads; how the triumph of tranquility would set in the wake of dishonesty, monetary insecurity, political strife, audacious violence, aggressive eastern neighbor and weak Afghanistan? In this milieu, an undeclared long clash on water resources and Indian surrogate violence is predestined to test the national stamina. Baring plenty of anthropogenic disasters, our strata are horizontal to many natural disasters thus putting an incredible impact of PTSD on our national vulnerability. In this back drop, let's dive deep inside and find how much PTSD has impacted Pakistan in sum total and find remedies so that we don't run weak in terms of psychosocial regards.

Recommendations

In the milieu of this research as a whole and the discussion above, few of the following pertinent recommendations both as short term and long term measures with inbuilt suggestions are proffered:-

a. Short Term Measures

i. **PTSD Therapy Centers:** To manage the flood and other natural disaster's related PTSD in the short term, "PTSD Therapy Centers" be established in the disaster zone hospitals all along the catastrophic regions, especially KPK. These may comprise the DHQ Hospitals of Charsada, Mardan, Nowshera, Mansehra and Peshawar alongside the Combined Military Hospitals (CMHs) located in the vicinity for detection, isolation and immediate management of PTSD pretentious fatalities. Victims with severe, acute, or persistent PTSD; together with limb loss may further be evacuated for rehabilitation at AFIRM and/or other main therapy centers which may be established in major private or public hospitals.

ii. **PTSD Training:** Essentially, a team of specialist doctors i.e. Psychologists and Psychiatrists and Associate Paramedics be selected across the nation in general and DHQ Hospitals of disaster hit districts in particular for PTSD Training / Management Courses overseas, particularly in USA and UK where such training is already in vogue. Funds for this noble concern should be committed in the public, regional and security budgets or as deemed appropriately enunciated in the National Disaster Risk Management (NDRM) Policy.

iii. **PTSD Legal Framework**: A decree to this cause be promulgated in the Senate of Pakistan to initiate an addendum clause in the National Disaster Management Act (2010) in the light of National Disaster Management Ordinance (2006) thus formulating a revised national policy / guidelines duly incorporated with Post Traumatic Stress Rehabilitation Strategies (PTSRS) in the best interest of PTSD afflicted areas / regions.

iv. **PTSD Management Plan**: To murky the impacts of PTSD among the victims, it is vital to pass up an extended or recurring revelation of affected population. An effective and well orchestrated "PTSD Management Plan" is deemed essential post a disaster (or flood) for efficient management of IDPs for their food, water, shelter and disease management with plenty of motivational and religious support.

b. Long Term Measures

i. PTSD Management Council : PTSD and its impacts which may be subclinical, clinical and extra-clinical, be deliberated countrywide by a panel of focused researchers; comprising the members from National Institute of Clinical Psychology (NICP), National Institute of Disaster Management (NIDM), National Defense University (NDU) as well as Armed Forces Institute of Rehabilitation and Medicines (AFIRM). Desirous member researchers from HEC and other academia may also be grouped. Recommendations of this focused study group be presented to the Prime Minister of Pakistan through Chairman NDMA to form PTSD Management Council at national level for necessary advice and policy direction with regards to cogent administration of PTSD.

ii. Flood Risk Management (FRM): An effective system of physical and meta physical "Flood Risk Management" in the shape of large / small dams, reservoirs with adequate water resource management strategies are needed not only to manage the flood risks and its associated trauma but also to meet the energy, economic and water crises, which the nation is at greater risk. Beyond any political interests or any such vested interest of our adversary, construction of Diamer, Bhasha and Kalabagh Dams is highly recommended.

iii. Interventional Strategies: These may be planned at large scale after carrying out the screening of mental health across the nation at large. Longitudinal researches may also be proffered in all the flood hit districts

of Pakistan in such a way that the researchers must keep focus and resist to know the complexities involved in the development of PTSD.

iv. **Psychodynamic Therapy Centers**: PTSD must be given a status of major issue while devising strategies for Disaster Risk Management (DRM) in Pakistan. Alongside medical and/or material relief of survivors, an effective system of Psychosocial Support is needed instead. To perform this task, establishment of "*Psychodynamic Therapy Centers"* is suggested in the disaster prone areas of Pakistan.

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ANNEXURE