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Examining Multi-level And Inter-organizational Collaborative Response To Disasters: The Case Of Pakistan Floods In 2010

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EXAMINING MULTI-LEVEL AND INTER-ORGANIZATIONAL COLLABORATIVE RESPONSE TO DISASTERS: THE CASE OF PAKISTAN FLOODS IN 2010

by

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ABSTRACT

Catastrophic disasters are different than routine disasters and managing them requires the mobilization of inter-organizational, inter-governmental, cross-sectoral and international humanitarian support. The role of the international community through International Non-governmental Organizations (INGOs), and multi-lateral organizations such as the United Nations (UN) becomes imperative when the scale of the disaster is unprecedented and difficult for a country to manage on its own. The initial response and relief phase of managing disasters is one in which many agencies with different expertise, capacities, working mandates, resources, skills, working cultures and norms come together to coordinate and collaborate to provide timely response and relief services. Thus, the terrain of managing catastrophic disasters is complex and requires a deeper study to understand and delineate the factors shaping and facilitating collaborative response and relief efforts.

This study examines the multi-level and multi-layered collaborative response networks present at the national-international level, provincial and district/local level of disaster response and interactions. In this research the nature and effectiveness of collaboration is being studied through a relevant case study of a catastrophic natural disaster, the 2010 Pakistan Floods. The phase of immediate response is explored primarily through Network Theory perspectives including supportive theoretical perspectives such as Social Capital, Resource Dependency, and Institutional Collective Action Theory perspectives that help to explain collaborative interactions in disaster response networks. This study explores and describes factors that influence (either facilitate or hinder) collaboration is disaster response networks.

The key research questions for this study are: What factors facilitate and impede collaborative response to catastrophic disasters at the local, provincial, national and international levels? What are the differences and similarities in response systems at different levels? Additional questions address how leadership support (attributed to government and political leaders and organizations), institutional support (in the form of plans, international appeals of response, and development of relief funds to manage aid), network capacity of different organizations (programmatic and relational), nature of resource dependencies between responding agencies, and structural configurations of response systems impact the collaborative response in disasters.

A case study method has been applied in this research. The 2010 Pakistan Floods response network/system is identified through content analysis of various newspapers, situation reports and after-action reports using the Social Network Analysis (SNA) method via UCINET Software 6.1. The actual response network is analyzed and compared with existing national disaster response plans to examine the effectiveness of collaborative response through centrality measures, clique analysis and visual display. This approach is supplemented with semi-structured interviews of key institutional representatives that responded to the 2010 Floods. These organizations and institutions were primarily identified through the networks formulated via SNA.

Findings and results from the analysis reflect that the response networks at each level of analysis differ both in structural aspects and also in functional aspects. The nature of the international-national response system is focused on mobilizing donor support and receiving and

managing aid, both in-kind and cash. Also a major role at the international and national level is to mobilize the UN cluster approach and focus on broader aims of response such as providing shelter and food to affected areas. Some of the factors identified as facilitating collaborative response were leadership of both national and international leaders, and availability of donor support and funds.

At the provincial level of analysis, the Chief Minister of Punjab is playing a central and influential role and is partnering closely with the Armed Forces and local district administration. Interviews conducted of provincial level officials help to support the hypotheses concerning leadership support's influence on collaborative response and also the role of institutional support in the form of creation of plans, and policies that help to mobilize quick funds and resources for relief. At the local level of response, networks are highly influenced by local conditions and local capacities of the district administration. Thus, there are diverse factors impacting each level of collaborative disaster response. All in all, leadership support, institutional support and network structural aspects are important variables that impact the effectiveness of collaborative response.

Today policy makers are trying to figure out ways to collaborate successfully across sector boundaries for better and effective service delivery, both in the mundane operational tasks and in uncertain and complex situations such as disasters and catastrophic events. Thus, this research helps in expanding the literature on collaborative public management, collaborative emergency management, and network management. Also the frequency of natural disasters throughout the world demonstrate the need to study and examine factors that contribute to or hinder the effectiveness of inter-organizational response in disasters.

I dedicate this to my

Ama & Aba, Mama & Baba, Dadi & Dada, Nano & Nana

(my most loving parents and grandparents)

Zain, *my companion, my best friend*

and

Amsah, *the love of my life.*

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Asian Development Bank	ADB
Chief Minister	CM
Construction & Works Department	C & W
Department of Homeland Security	DHS
Dera Ghazi Khan	DGKhan
Disasters Emergency Committee	DEC
District Commissioners	DCs
District Coordination Officer	DCO
District Disaster Management Authority	DDMA
District Emergency Operations Center	DEOC
District Disaster Management Authority	DDMA
Economic Affairs Division	EAD
Emergency Relief Cell	ERC
Federal Flood Commission	FFC
Government of Pakistan	GoP
Hyogo Framework for Action	HFA
Institutional Collective Action	ICA
Internally Displaced Populations	IDPs
International Committee of the Red Cross	ICRC
International Federation of the Red Cross and Crescent Societies	IFRC
International Non-governmental Organizations	INGOs
International Organization of Migration	IOM
Khyber PakhtoonKhwa	KPK
Multi-Lateral Agencies	MLAs
National Disaster Management Authority	NDMA
National Disaster Management Commission	NDMC
National Disaster Response Plan	NDRP
National Disaster Risk Reduction	NDRR
National Emergency Operations Center	NEOC
Non-Food Items	NFIs
Non-governmental Organizations	NGOs
Office for the Coordination of Humanitarian Affairs	OCHA
Pakistan Air Force	PAF
Pakistan Meteorological Department	PMD
Pakistan Red Cross Society	PRCS
Provincial Disaster Management Authority	PDMA

Provincial Emergency Operations Center	PEOC
Punjab Health Department	PHD
Social Network Analysis	SNA
Social Welfare Department	SWD
Standard Operating Procedures	SOPs
Tehsil Municipal Department	TMA
United Kingdom	UK
United Nations	UN
United Nations Children's Fund	UNICEF
United Nations High Commissioner for Refugees	UNHCR
United States	US
US Agency for International Development	USAID
Water and Power Development Authority	WAPDA
Water and Sanitation Authority	WASA
World Bank	WB
World Food Programme	WFP
World Health Organization	WHO

CHAPTER ONE: INTRODUCTION

Managing catastrophic disasters is not the job of the government or the public sector alone. Catastrophic disasters are different than routine disasters due to the sheer size and scale of impact and the enormous destruction caused to the existing emergency response system (Kapucu & Van Wart, 2006). Today a myriad of organizations from the private sector, the nonprofit sector, and faith-based agencies along with traditional emergency management government and public sector response agencies play an integral role in responding to disasters and the needs of affected civilians and survivors. The role of the international community through International Non-governmental Organizations (INGOs), and multi-lateral organizations such as the United Nations (UN) also becomes imperative when the scale of the disaster is unprecedented and difficult for a country to manage on its own. Thus, the initial response and relief phase of managing disasters is one in which many agencies with different expertise, capacities, working mandates, resources, skills, working cultures, and norms come together to coordinate and collaborate to provide response and relief services. Thus, the terrain of managing catastrophic disasters is complex and requires a deeper study to understand and delineate the factors shaping and facilitating collaborative response and relief efforts.

1.1 Statement of the Problem

Interdependence and interconnectedness characterize the intergovernmental and interorganizational environment of disaster management. According to McGuire and Silvia (2010), "emergency management is an ideal context within which to examine the general forces

of intergovernmental collaboration" (p. 280). Interorganizational collaboration and partnerships are a direct result of operating in and adapting to a complex organizational environment. When organizations have to operate in dynamic and uncertain environments and face wicked problems (Kettl, 2006), they resort to spanning boundaries and building external relationships that take the shape of collaborative networks. Intergovernmental and inter-sector collaboration becomes imperative since no single organization, nor a jurisdiction, has the complete resources and capacity to deal with disasters and catastrophes (McGuire & Silvia, 2010; Moynihan, 2005). Thus, the greater the severity and impact of disaster, the greater the need for a collaborative response (McGuire & Silvia, 2010).

Collaborative governance and networks are essential to managing crises and disasters. However, functioning in a network of interdependencies and complex relationships through collaboration and cooperation is not the simplest of tasks. As Kapucu (2008) states, "organizing a cooperative effort, though, is almost as difficult as the problems that the initiative is created to address" (p. 256). Uncertainty of roles and responsibilities and a lack of coordination between responding players within disaster management networks is a main reason why response operations are weak and often fail to accomplish the set out goals. Also many policies and plans dealing with disasters approach emergency management and disaster response through a top-down management style expecting an effective response.

The example of the creation of the Department of Homeland Security (DHS) by the US government post September 11, 2011, to address communication and coordination failures in disaster response (Schafer, Carroll, Haynes, & Abrams, 2008), and the popular top-down 'cluster approach' adopted by the UN to improve coordination between responding agencies during

international disasters (Thomas & Rendon, 2010), are just few examples of the traditional top-down approach of managing disasters. However, leveraging various resources effectively from different levels of the government, different countries, and different sectors requires more than a top-down initiative. It requires intra- and inter-agency collaboration (Schafer et al., 2008). Thus, collaborative response and collaborative disaster management may be effective when pre-existing relationships and protocols have been developed between different organizations, when operating staff and response teams are well trained and equipped with the capacity to communicate with each other, and when leadership support and the political will of elected officials exists to make collaborative response effective (Kapucu, 2008, 2005). Thus, it is important to explore the conditions that influence the structure and functioning of a collaborative system.

Networks are important sources of resource sharing, mutual discovery and knowledge sharing (Agranoff, 2006). In disaster response networks or in other informal networks where organizations are not legally bind to work together, Agranoff and McGuire (2001) ask an important question: Why would organizations decide to work together and solve problems? According to the authors, literature suggests reasons such as "trust, common purpose, mutual dependency, resource availability, catalytic actors, and managerial ability" play a crucial role in determining why agencies work together and collaborate (2001, p. 312). A myriad of factors help to determine whether networks function successfully and effectively. The actual networks that develop in disasters are a result of both formal and mandated disaster management plans and also the emerging contextual nature of the disaster that requires the mobilization of resources and strategies outside the existing plans, operating procedures, and protocols. Many scholars suggest

that decentralization and improvisation is important for coordination in complex environments (Kendra & Wachtendorf, 2003; Mendonca & Fiedrich, 2004).

A well-functioning, coordinated and collaborative response network also constitutes of multiple layers and levels of response. If a response system is analyzed in a complete manner it will comprise of inter-governmental exchanges, inter-sector transactions, multi-lateral and bi-lateral links and these transactions will be most likely arranged in clusters around certain response functions such as: distribution of food items, search and rescue operations. It is important to understand that collaborative response in disasters is a multi-level (Maldonado, Maitland, & Tapia, 2010) and multi-layered function (Telford, Cosgrave, & Houghton, 2006). Response to disasters is a layered function and involves complex operations by different sectors and organizations. Telford et al. (2006) describe two main components of response activities as: the local and national component and the international component. The local and national component usually is tasked to bring in context-based knowledge while the international component brings in technical expertise, financial aid, and resources. Other studies also categorize the different levels as: local, state/provincial, national/central and international. This study explores interorganizational response networks at different layers by identifying which factors influence collaborative response at each level identified in the multi-layered response system. The multi-layered response system in this study is divided into three levels: the international-national response system; the provincial response system; and the local/district level response system.

1.2 Research Questions

This research will focus on studying the interorganizational and multi-layered network response at the national-international level, the provincial level and the district level. The main goal of this study is to explore factors that facilitate or hinder effective and successful inter-organizational collaborative response at these levels using the 2010 Pakistan Floods as a case study.

The research questions for this study are:

Q1: What factors facilitate and impede interorganizational collaborative response to catastrophic disasters at the local, provincial, national, and international levels?

Q2: What are the differences and similarities in the response systems at different levels? What response functions/operations are important at different levels of response?

Q3. How does leadership support in response systems impact interorganizational collaborative response to disasters?

Q4. How does institutional support (in the form of formal and informal structures such as plans, international appeals for response, etc) facilitate collaborative response in disasters?

Q5. How does the network capacity of different organizations responding in disasters influence and impact collaborative response?

Q6. How does the level and nature of resource dependencies between different organizations influence collaborative response in disasters?

Q7. Which structural configurations in networks hinder or/and facilitate collaborative response in disasters? Is decentralization superior to a centralized structure of the response system?

Most studies have discussed the antecedents of collaboration (Bryson, Crosby, & Stone, 2006) rather than exploring the effectiveness of collaboration. In this research, the nature and effectiveness of collaboration is being studied through a rich case study of a catastrophic natural disaster, the 2010 Pakistan Floods. The phase of immediate response is explored primarily through Network Theory perspectives including supportive theories such as Resource Dependency, and Institutional Collective Action Theory that help to explain collaborative interactions in disaster response networks. This study explores and describes factors that influence collaboration is disaster response networks.

1.3 Significance of the Study

This research is significant and timely due to the nature of the study problem. Today policy makers are trying to figure out ways to collaborate successfully across sector boundaries for better and effective service delivery, both in the mundane operational tasks and in uncertain and complex situations such as disasters and catastrophic events. Thus, this research helps in expanding the literature on collaborative public management, collaborative emergency management, and network management. Also in recent years, one observes a drastic increase is catastrophic disasters across the globe. Thus, it is imperative that the response to disasters is studied in more detail to highlight factors that contribute to or hinder the effectiveness of inter-organizational response and relief efforts. This study is a first attempt to come up with a

comprehensive list of factors that influence inter-organizational collaborative disaster response at different levels of governance. Only recently have other scholars such as Ngamassi, Maitland, and Tapia (2013) studied network effectiveness in the humanitarian relief field using Social Network Analysis (SNA) tools. The nature of disasters is usually such that a specific area or region is impacted. The case of the 2010 Floods was different and unprecedented since the whole country was impacted and all provinces were facing a natural calamity. Thus the scale of the disaster in terms of the impact, destruction and subsequently, the humanitarian response warrants this as an important case to study. The findings from this research contribute to improving disaster policies and plans across different countries and the international arena for improving disaster risk reduction and mitigation efforts. Factors found to facilitate a successful response in disasters should be addressed in the mainstream disaster literature and also in professional circles so that better future policies are designed and implemented for disaster management around the world.

1.4 Context of the Study

The frequency of natural disasters throughout the world demonstrate the need to study how different levels of government, sectors, agencies come together and collaborate in ways that response is effective and timely so that lives are saved and destruction from the disaster can be minimized. All phases of disaster management, namely, mitigation, preparedness, response, and recovery are interconnected and impact how disasters can be managed in effective ways. However, the focus of this study is on the response stage of managing disasters since this is the most complex stage in which different agencies are expected to work collaboratively and make decisions in a timely manner in a state where there is a high level of uncertainty, stress, chaos,

and overburdening on existing structures, capabilities and resources (Baker & Refsgaard, 2007; Paton, 2003; Ritchie, 2004; Benini, 1997). It is at the response stage of a disaster where a single event leads to cascade-like chain reactions (Helbing, Ammoser, & Käuhnert, 2005). For example in the case of the Pakistan Floods of 2010, flash flooding in the northern parts of the country led to cascading events involving blocking of roads, complete destruction of infrastructure such as bridges, communication disruptions, destruction of crops, and spread of waterborne diseases.

To explore the complexities and challenges of effective disaster response it is important to study a huge recent disaster. In 2010 the Haiti Earthquake and the Pakistan Floods stood out as catastrophic events and were referred to as mega-disasters as around 95% of funding by international agencies in 2010 went to these two events alone (Ferris & Petz, 2011). For this study the Pakistan Floods of 2010 was chosen as the case study since this disaster was referred to as the worst disaster in the history of the country (Asian Development Bank [ADB], 2010). Moreover, the UN Secretary General upon visiting the country declared that this disaster was larger than the accumulated impact of major disasters such as the 2004 Asian Tsunami, the 2005 Kashmir Earthquake, the 2008 Nargis Cyclone and the 2010 Haiti Earthquake (Solberg, 2010). Moreover, Pakistan is the country where the UN cluster approach was first piloted in 2005 in the Kashmir Earthquake. It was again applied in the 2010 Floods. The implementation of a UN response plan in the Pakistan Floods reflects the importance of the role of international humanitarian and Multi-lateral agencies (MLAs) in response and relief operations. Thus, in order to understand the multi-layered and multi-level response and governance system in disasters it is imperative to study a case where the international role is integral.

1.5 Analytical Approaches

A case study method has been applied in this research. The 2010 Pakistan floods response network/system is identified through content analysis of various newspapers, situation reports, and after-action reports using the Social Network Analysis (SNA) tool via UCINET (Borgatti, Everett, & Freeman, 2002). The actual response network is analyzed and compared with existing plans such as the National Disaster Response Plan (NDRP) of 2010 by the National Disaster Management Authority (NDMA) in Pakistan and also the UN Initial Response Plan for the Pakistan Floods that follows the UN inter-agency cluster approach. This analysis is carried out by developing planned networks through the existing plans and SOPs of responding agencies included in the NDRP of 2010. The effectiveness is gauged by comparing the actual network with the existing response plans and also through various network analysis measures such as relationship measures including centrality measures (Knoke & Yang, 2008), clique analysis, and visual display. This approach is supplemented with semi-structured interviews of key institutional representatives that responded to the 2010 Floods. These organizational representatives and institutions were primarily identified through the networks formulated via SNA.

1.6 Organization of the Study

This dissertation comprises of six chapters. Chapter I provides an introduction to this research and includes the statement of the problem, the significance of the study, the research questions this research sets out to answer, a brief description of the background and context of the study, and the analytical approach utilized in this research.

Chapter II describes the theoretical framework applied in this research. This section also presents a review of the literature on the multi-level nature of disaster response and outlines key theoretical perspectives utilized in this study. The conceptual model is also developed and discussed in detail.

Chapter III discusses the context of the study. The risks and vulnerabilities in Pakistan are briefly discussed along with the disaster management system in the country and the roles and responsibilities of key responding agencies at the federal, provincial, and district levels. The UN cluster approach is also discussed. This section also describes the background information on the Pakistan Floods of 2010 in terms of its impact, devastation and importance.

Chapter IV discusses the methods used in conducting this research. The data collection methods and the justification of the research methods used are provided in this section. This chapter discusses the SNA tool and it's various measures utilized to analyze the response systems and networks.

Chapter V focuses on the analysis, discussions and key findings of the research. This section details the results from SNA along with the results of document analysis (reports and disaster management plans). Alongside this section highlights some results and insights from the semi-structured interviews.

Chapter VI, the concluding chapter provides an overview of the key findings from the research, followed by a discussion on the various policy and methodlogical implications of the

study. The chapter concludes with some recommendations to improve the current system for responding to disasters in Pakistan and limitations of the current study.

CHAPTER TWO: LITERATURE REVIEW AND THEORETICAL PERSPECTIVES

The previous chapter introduced the problem statement, the research questions, and the significance and contributions of this research, along with the analytical approach applied in this research. This chapter provides the literature review and theoretical framework for the research study. The literature review is divided into two sections. The first section deals with the general background and literature pertaining to the multi-level structure and collaborative nature of disaster response. The second section of the literature review discusses the theoretical perspectives that are applicable to this research and guide the development of the conceptual framework for this study. The theoretical perspectives applied in this research are focused on network theory perspectives. The theories used in this research to support network perspectives are: Resource Dependency Theory, Institutional Collective Action Theory, and Social Capital Theory. Network perspectives pertaining to the structural aspects of studying and analyzing networks are also applied. These theoretical perspectives are linked to the multi-level collaborative response in disasters and propositions and hypotheses for the study are developed. The last part of the chapter integrates the propositions and hypotheses through a conceptual framework that guides this study.

2.1 Multi-level Governance and Collaborative Disaster Response

Disasters provide an avenue for "a litmus test for federal, state, and local governments' effectiveness, efficiency and accountability in managing disasters" (Moe, 2010, p. 330). In addition to testing the efficiency of different levels of government, disasters also test the capacity

of non-government players. Disaster response is not restricted to intergovernmental collaboration and governmental layers but includes cross-sector organizations and international humanitarian agencies and international governments. The relationships between governance structures are complex areas to study as relationships span boundaries and sectors (Lynn, Heinrich, & Hill, 2000). The concept of multi-level governance can be applied to disaster management. Multi-level governance is defined as a decision-making process that involves the competencies of multiple players rather than the government or state alone and often extends beyond national boundaries and includes international or transnational players (Marks, Hooghe, & Blank, 1996). The multi-level governance concept has been applied to economic development and sustainable development practices and policy formulation. It has been widely applied to the European integration and development of the European Union indicating the move away from state-centric governance to multi-level and supranational governance (Marks et al., 1996). More recently, multi-level modes of decision-making processes are being applied to develop and adopt mitigation strategies for climate change. The development and adaptation of these policies and decisions require the coordination at different governance levels (Katherine et al., 2011).

The multi-level governance model emphasizes negotiated and integrated institutional exchanges that are replacing the hierarchical exchanges in intergovernmental relationships (Peters & Pierre, 2000). Some critics view this as an approach that would weaken national and state governments (Marks et al., 1996). However, the complexity of issues and nature of problems warrants this mode of governance and integrated decision-making. This concept is applied to describe the multi-level nature of response and the multi-level governance structure required to address challenges relating to immediate relief and response during disasters. The

nature of collaboration in the context of disasters is explored as a multi-level, layered function in the review of literature provided below. The multi-level response is divided into three layers: the local/district level, the state/provincial and national level, and the international level of response.

2.1.1 Local/District-Level Collaborative Response

Local and community-level response incorporates local vulnerabilities and local capacities and capabilities. It also reflects the collective perceptions about risks in the community and how they collectively deal with emergencies. The community response depends on the nature of risk and vulnerabilities, the social construction of perceived risks which is based on shared and collective experience of the community, and the local collaborative and interactive capacity to work with organizations. Moreover the way in which a community perceives risks and threats influences the way they mitigate or address those threats (Flint & Luloff, 2005).

The efficiency/effectiveness of disaster response is influenced by the severity of disaster, type and quantity of resources available, number of organizations and jurisdictions involved, and the multifaceted response strategies involved. Research shows that the number of jurisdictions involved is actually positively related to efficiency in response (Comfort, Ko, & Zagorecki, 2004). Local intergovernmental collaboration varies from place to place depending on problem severity, capacity of management, and structural factors (McGuire & Silvia, 2010). Local resource capabilities for local disaster management are a function of "institutional resources, human resources, policy for effective implementation, financial, and technical resources and leadership" (Kusumasari, Alam, & Siddiqui, 2010, p. 441). A study by McGuire and Silvia (2010) on local emergency management networks covering data of over 400 county level

disaster management agencies shows that public managers that perceive "problems as severe… lead high-capacity organizations, and operate in less complex agency structures collaborate more often and more effectively across governmental boundaries" (p. 279). The study results also show that a higher level of external collaboration and its effectiveness will result when organizations responding are lead by managers that not only possess the managerial capacity and skills to facilitate effective interaction between organizations and players in a network, but are also involved in external collaboration and partnerships in meeting their organizational mission and goals (McGuire & Silvia, 2010).

Crisis leadership is an important factor to consider in collaborative response. Successful response by leaders turns them into heroes and statesmen, while unsuccessful and ineffective response makes leaders easy scapegoats to bash (Boin &'t Hart, 2003). Thus, leadership within a network also influences collaborative response at the local disaster management level. A study by Choi and Kim (2007) shows that networks in disaster response that identify clear leadership are effective since participants have a clearer picture of communication flows and leadership concerns. According to Van Wart and Kapucu (2011) the set of leadership competencies needed in crisis response situations by senior emergency managers and administrative leaders is fairly different than leadership competencies in routine situations. According to their findings there is need for calm but strong leadership that is willing to assume responsibility, exhibits strong communication skills and the need for a leader who is adept at making decisions during time and resource constraints. Moreover, to ensure effective response the leader needs to be able to cultivate a sense of team effort, needs to be able to network and partnership with other entities and enjoy strong social and communication skills.

Political or elected leadership has a crucial role to play before and during disasters. During Hurricane Katrina in 2005, there were a lot of coordination problems and confusion between political players. However, when Hurricane Katrina is compared with the 2004 hurricane season, one observes leadership support for pre-existing mutual aid agreements between agencies and open communication lines between various local jurisdictions (Kapucu, 2008).

At the community and local level, existing disaster management plans, policies, and protocols help to guide disaster response. Many scholars suggest that learning can be institutionalized in the form of plans and policies that are formed after disaster events. Theoretically pre-planning will improve collaborative results as plans help to define roles and allow better and quick response in crucial times. Roles and resources do not have to be determined and negotiated at run-time. Existing plans and policies help to determine communication and information channels as well (Carley & Harrald, 1997). To ensure collaborative effectiveness in response, it is important to explore the embedded relationships between organizations. According to Gulati and Gargiulo (1999) a history of cooperation between organizations increases the chances of future cooperation and strategic alliances with each other. Hicklin et al. (2009) study collaborative public management in school districts in Hurricane Katrina and Rita. Their study shows that prior networking and established collaborating patterns and styles of managers in organizations may influence collaborative response in uncertain and dynamic situations. These prior collaborative and networking patterns by managers represent the development of social networking capital, that helps in paying

"dividends on collaboration in the future, and in particular during unexpected crisis periods" (p. 21).

Misperceptions and misunderstandings about the intergovernmental roles and responsibilities during disaster response can cause a lot of destruction and chaos during disaster events. Response in Hurricane Katrina shows that the intergovernmental response was weak since organizations and entities involved in responding lacked the understanding of their tasks and roles in the overall response (Schneider, 2008). Thus, effectiveness of response is a function of intergovernmental cooperation and communication (Comfort, 2007). For an effective response, relief organizations and officials need to understand their roles and responsibilities and their links to others involved in the emergency management process. It is also imperative that they are aware of their roles in typical disasters and also in huge catastrophic disasters (Schneider, 2008). In theory, and according to plans, the response system may be well-developed and well-coordinated. However, during actual events, organizations and officials may not restrict their roles to the pre-established and pre-assigned responsibilities (Schneider, 2008).

Kapucu et al. (2010) discuss that interoperability is key when different organizations are responding and sharing a large number of different resources amongst them. Interoperability according to the authors involves an operational and a technical element. The technical element which is technology-driven supports interoperable operations and fails to function successfully without the operational structure and culture of sharing and mobilizing resources between organizations working together. Technical equipment and resources such as GIS maps can aid effectiveness of response. GIS maps are used in disasters to map power outages and flooding routes that aid first responders in their operations (Kapucu, 2008). Along with interoperability

and technical support, Kapucu et al. (2010) also highlight the importance of interpersonal communication. For successful collaboration, mutual understanding between organizations, strong interpersonal relations between managers and staff and pre-existing mutual aid agreements and memorandums of association are important.

Mostly in disasters when plans and protocols break down and demands for resources increase, emerging and voluntary groups surface to provide disaster response and relief. These emergent groups operate locally and contain members of relief missions, private organizations and the civil society (Majchrzak et al., 2007). Thus, structural factors such as pre-existing coordination plans and national disaster plans, along with non-structural factors such as adaptability, flexibility and innovation are important factors for a successful collaborative response to disasters. Thus both discipline and agility have to be incorporated in disaster response (Harrald, 2006), which makes the task even more challenging.

2.1.2 Provincial/State and National/Central-Level Collaborative Response

Crises are periods of "high threat, high uncertainty, and high politics that disrupt a wide range of social, political, and organizational processes" (Boin &'t Hart, 2003, p. 546). True governance structures reflect power sharing between different entities including political leaders, government officers, nonprofit managers and civil society groups (Boin &'t Hart, 2003). Thus, at the state-level power flows both upwards and downwards. It flows to the local level when plans are mandated and funds and relief goods are distributed via state level government agencies and coordination boards. The power and resources flow to the federal level in terms of information and communication exchange pertaining to updates on operations and relief efforts at the local

level. Feedback on transparency, accountability and relief goods and funds distribution will also flow to the federal level via the state level and provincial officers. Thus, the role of states and provincial level officers is to coordinate and overlook ground response and relief operations. State level collaboration mostly deals with providing the link between federal/national sources, plans and funding and the local regions where those resources need to be mobilized and used. The role of states and provinces are more clearly delineated in developed countries like the US. For instance, in Australia the state governments have developed emergency management plans and arrangements that are defined through legislation. Also states provide support by providing emergency services such as police, fire and health. States are additionally responsible to ensure that plans and policies are in place to deal with disasters (Abrahams, 2001). However, in developing countries such as Pakistan, disaster impacts may be largely handled and addresses by provincial level organizations rather than local level organizations due to a lack of capacity at local levels (Ainuddin & Routray, 2012).

It is very difficult to separate politics from disaster response (Moe, 2010), in the context of state-level and federal-level response. At the national level presidential leadership plays an important role in determining the effectiveness of collaborative disaster response. Presidential leadership support and President's communication with disaster relief agencies at the state level and with governors can expedite disaster relief efforts (Kapucu, 2009). President's actions and activities regarding disaster relief requests, presidential declarations and presidential addresses to the general public in times of crisis are closely monitored by the general public and media agencies. Thus, presidential and political leadership's responsibility should not be overlooked in leading response and relief efforts. By and large, federal level agencies and national disaster

management agencies are expected to play a leadership role in coordinating response and relief efforts.

2.1.3 International-Level Collaborative Response

Developing countries rely heavily on international humanitarian organizations and their leadership during crises events. The United Nations' 'cluster system' is a popular response and relief approach that is used in huge disasters through which relief agencies coordinate their efforts in clusters and sectors. The main goal of the cluster system is to provide timely and coordinated response in disasters. Each cluster is guided by a specific humanitarian service and is assigned a lead agency to oversee and coordinate efforts and also individuals that are referred to as cluster coordinators. The 'cluster approach' is a top-down, UN centered initiative that aims to offer timely and effective response and improve coordination between various responding agencies and actors in huge disasters (Thomas & Rendon, 2010).

Although theoretically this system is an ideal collaborative governance arrangement or network, practically it is weak. Even though there has been ample structural and organizational reform in the humanitarian system in recent years, the UN cluster approach continues to lack effective disaster response capacity (Kapucu, 2011). According to Hicks and Pappas (2006), the UN system has not been "uniformly successful in ensuring delivery of an effective, reliable, and well-coordinated response" in humanitarian assistance in disasters (p.42).

The cluster system works to organize relief according to functional operations within different sectors with a predefined and predetermined leadership. This approach was developed and implemented with the aim to improve and increase overall efficiency and effectiveness in a

number of areas such as: global capacity for responding to existing and future crises; predictable leadership at both the global and local levels; strong partnerships between responding agencies such as UN agencies, international NGOs and local agencies; accountability and transparency in relief operations; and strategic prioritization and coordination in implementing various clusters during emergencies (Office for the Coordination of Humanitarian Affairs [OCHA] , 2007).

This approach was first implemented and tested in the South Asian Earthquake/Kashmir Earthquake in October 2005. The challenges identified were: "the lack of a clear geographic and thematic division of roles and responsibilities, poor inter and intra-cluster communication, weak cluster leadership, and duplication of efforts" (Hicks & Pappas, 2006, p. 44). After 5 years, the UN cluster approach was implemented again in Pakistan during the 2010 Pakistan floods. However, the UN cluster system according to reports was still "ill-prepared, uncoordinated and under-resourced" (Thomas & Renden, 2010, p. 5). Even after few years of implementation, the cluster system faces challenges. Some of the key challenges are listed and discussed below.

The Under Capacity of Cluster leads. Cluster leads are responsible for both central level and local capacity building through various activities such as building personnel rosters, stockpiling relief goods, and training personnel. Also, the lead agencies work as the 'provider of the last resort' implying that if no other agency in the cluster has the capacity or resources to provide needed services and relief functions, then the cluster lead is automatically considered responsible for delivering the service. This is essentially challenging since not all cluster leads have the capacity nor the expertise and resources to fulfill this commitment in some huge humanitarian crises (Jahre & Jensen, 2010).

Cluster leads not only require a certain level of technical proficiency to carry out coordination tasks effectively but they also need to ensure that all players are operating according to the roles assigned and delivering in timely and effective manner. This requires follow up and transparency in the process. There may be a level of conflict between agency agendas and cluster agendas.

Weak Inter-cluster coordination. Previous evaluations and reports have identified weak inter-cluster coordination in disasters. Jahre and Jensen's (2010) evaluation on the logistics cluster shows that this particular cluster depends on other clusters for information and transportation. Thus, inter-cluster coordination is very important to ensure an effective response. The strong emphasis on within cluster coordination between organizations can adversely impact the development of efficient and effective supply chains that require strong inter-cluster collaboration during disasters. Internal horizontal coordination has been the focus of improvements, ignoring the need for and improvements in inter-cluster horizontal coordination and vertical coordination. Moreover, previous reports and analysis show that some clusters have performed better than others and this is a direct result of leadership within these clusters. Strong operational capacity of lead agencies has resulted in better performance of certain clusters. Some clusters performing well while other not jeopardizes overall inter-cluster coordination.

Reservations by host country governments. There have been instances and events in which the UN leadership requested the implementation of the cluster approach in certain countries but the governments of the countries refused to implement the approach. However, the UN suggests that in case of reservations to implement the approach by host countries it will be

difficult to arrange for donor support and funding through the UN. The cluster system was essentially implemented and developed to reduce the fragmented response and lack of coordination in disaster response. However, this approach has reduced the role of the host governments in overall response and this threatens governments and its traditional forefront role in disaster response (Fagen, 2008).

Moreover, while this system is designed to increase predictability, one dilemma that is faced is the need and urge to develop flexibility in the system that helps clusters adapt to national and local situations (Mister, 2006). Thus, the integration of national and local actors in the cluster approach will help to address the flexibility concern as well. Despite the current systems' weakness, the UN centric international response forms the core response strategy in many developing nations that do not have the capacity, capabilities, resources and skills to respond effectively.

The International response to disasters also comprises of response by different countries and their governments. Humanitarian aid and disaster assistance forms a major part of disaster response at the international level. Drury et al. (2005) explore the link between disaster assistance and humanitarian aid, with politics and political influences. There are three major political connections to disaster assistance decisions: US foreign policy concerns about the disaster-stricken state, domestic US policies and political climate, and domestic politics within the disaster struck country. If the disaster struck country is inefficient, corrupt, then accountability concerns will arise and hinder the smooth flow of funds and aid (Drury et al., 2005). Cherniak et al. (2010) view relief coordination through an economic frame and suggest

that international financial stakeholders, such as G8 members will invest a lot in disaster fund relief efforts but will also want a transparent and accountable process of relief fund distribution.

Another important factor to consider in international response and humanitarian assistance is the level of media attention the disaster event has managed to attract. The more salient and critical the disaster is portrayed in the media, the more international assistance and aid will flow to the disaster-stricken country (Drury et al., 2005). Drury et al. (2005) find that one New York Times article brings in more disaster aid than the impact 1,500 fatalities would bring. Thus, the role of media coverage and salience should not be undermined.

The multi-level governance theory proposed and developed by political scientists (Maldanado et al., 2010) might provide some insight for multi-level governance in response to disasters. Maldanado et al. (2010) explain the multi-level governance perspective as one that 'integrates governance issues in the context of both multiple international organizations and power differentials between the high income nations of headquarters and the low income nations of field offices' (p. 10). Literature also suggests 'the complex, and sometimes contradictory, authority structures found in multi-level, multi-organizational contexts' (p. 10). The multilevel governance concept, which has its roots in the political science field, has been applied to development agencies and also the international disaster relief organizations. The multi-level governance concept is important since its value lies in appreciating the complexity and links between different governance levels.

The decision-making authority in disaster contexts is dispersed through layers. The multi-governance theory had two parts: the vertical dimension which concerns links with higher and lower government levels and the horizontal dimension which reflects cooperation and

coordination amongst regional bodies (Maldanado et al., 2010). In developing countries, where local capacity of managing disasters is weak, local organizations depend on INGOs and other International humanitarian relief organizations and their services (Moore et al., 2003). Thus the flow of resources from higher levels to the lower levels in the multi-governance framework is the most important and crucial factor that binds collaborative organizations together (Maldanado et al., 2010). Resources can be in the form of financial resources, humanitarian aid, relief teams, personnel and local project managers to ensure accountability and transparency in relief provision and goods distributions (Moore et al., 2003).

The development of disaster management systems in lower income countries are marred by multi-level governance since the systems are defined by many rules and protocols through which projects and programs are controlled and operated. Mandates flow from higher levels of government and through International organizations for collaboration. Headquarter-mandated efforts may translate from coercive pressures to effective and sustainable collaboration in disaster response and humanitarian relief efforts. According to Maldanado et al., (2010), "coercion may serve to prime the collaborative pump, bringing local NGOs together, outside of their inward-looking day-to-day activities, forcing them to think strategically across organizations to solve big problems" (p. 25). Moreover, the political environment for the coordination of disaster relief continues to be UN-centric. According to Cherniak et al. (2010), the UN enjoys monopolistic power and decision-making authority in relief efforts. Moreover, International NGOs seem to be the most central organizations during humanitarian aid response and operations, especially in developing countries. The 2000 Mozambique Floods response reflects a hierarchical model of resource allocation as national agencies and local agencies

depend on the resources and expertise of INGOs. Also INGOs seem to be better positioned to lead flow of information and coordinate disaster response and relief efforts. However, it would be naïve to assume that dependence relationships between government organizations and NGOs and international NGOs and local organizations will be smooth. According to Moore et al.'s (2003) research conclusion, it was identified that coordination and collaboration was better in the immediate response stage when the INGOs presence was huge, while coordination weakened in the recovery period.

The literature identifies that to explore the multiple-level dependencies between organizations and their varying roles and power structures within collaborative response, we need to explore collaborative response as a multi-level response and layered function. Multi-level collaborative response explores and identifies different elements and factors that facilitate or hinder effective collaborative response. Through the literature review we see different dynamics in play at all three levels explored. There are some consistent themes in each layer of disaster response such as leadership (political, governmental, and organizational), institutional support (in the form of mandates and rules, pre-existing plans, protocols and procedures), and the need for strong networking and partnership avenues. The literature also suggests that during disaster response resources at all levels are being exchanged both vertically and horizontally between different entities. These resources are in the form of relief goods and services, informational exchange, financial resources and grants, technical resources ensuring interoperability, and human resources involving teams and leaders guiding disaster response. Moreover, the literature also highlights the importance of pre-existing trust between different

layers of government agencies both horizontally and vertically that leads to effective response and recovery in disasters (Kapucu, 2006; Kettl, 2005).

2.2 Theoretical Perspectives on Collaborative Networks in Response to Disasters

Networks and collaborative settings are being studied in disaster research but do not qualify to be covered under standard organizational theory due to their dynamic and unique nature. This has forced disaster researchers to adopt innovative approaches of combing theories and developing new conceptualizations and using open systems theories (Quarentelli & Dynes, 1977). Interorganizational networks and operational response plans have been studied through the complex adaptive systems theory perspectives (Kapucu, 2009a; Comfort et al., 2004), theory of sense-making and organizational learning theory (Kapucu, 2009a). This research uses network Theory Perspectives which include Resource Dependence Theory (RDT), Social Capital Theory (SCT), and Institutional Collective Action Theory (ICAT) as they provide a strong foundation to understand the interdependence of organizations at different layers of disaster response and relief. These theories discuss resource mobilization and dependencies, institutional support and networks which can be directly linked to the multi-layered, inter-organizational response in disasters and provide a strong foundation for understanding the interdependence of organizations at different layers of disaster response and relief.

2.2.1 Network Theory Perspectives

Collaboration and network management have grown as fields of management as knowledge has become highly distributed and institutional capacity and frameworks have become interdependent and complex (Ansell & Gash, 2007). Networks are multi-organizational

arrangements for addressing issues that cannot be tackled by single organizations. Networks function in ways and facilitate functions in a manner that lies somewhere in between 'the openness of the market and the rigidity of the hierarchy' (Agranoff & McGuire, 2001, p. 305). According to Jones et al. (1997) the network form of governance will thrive and emerge when certain conditions exist. Two of the conditions that fit into the disaster management context are: 'complex tasks under time pressure' and 'frequent exchanges among parties comprising the network' (p. 918) especially in the response stage of emergency management.

Powell (1990) describes networks as exhibiting "reciprocal patterns of communication and exchange" (p. 295). The element of exchange in the form of distinctive competencies (skills and knowledge), and in the form of resources seems to be integral to network structures. Brass et al. (2004) define a network as "a set of nodes and the set of ties representing some relationship, or lack of relationship, between the nodes" (p. 795).

Network research focuses on studying the relationships and ties between actors and their structured patterns of interaction in a network (Krebs & Holley, 2002). Ties in network research can depict relationships that are based on different attributes and functions such as communication, friendship, exchange, collaboration (Katz & Lazer, n.d.). Members of a network maybe be tied with one another through resource sharing, information flows, financial resources, services and these connections can be both formal (legal or contractual) and informal (trust-based) (Provan et al., 2007). Moreover, relations can be directional (flowing from one node to the other) or non-directional (that implies a mutual sharing of resources or simply working together) (Krebs & Holley, 2002). The interactions and relationships taking place within the

network and the overall network structure can be analyzed through many dimensions such as centrality, connectivity, network size, brokerage.

There is no single complete network theory (Galaskiewicz, 2007), but in fact it is combination of different theories some of which are Resource Dependency Theory, Institutional Collective Action Theory, and Social Capital Theory.

2.2.1.1 Resource Dependence Theory

The Resource Dependence Theory (RDT) is an open systems theory that applies to organizations and their behaviors. According to this theory organizations are not self-sufficient and require resources from other organizations and external sources in order to operate and survive (Pfeffer & Salancik, 1978). In 1978 Pfeffer and Salancik wrote a book on the 'External Control of Organizations: A Resource Dependence Perspective', in which they introduced the RDT. Since their publication, the RDT has been applied to various fields to understand and explain organizational behavior (Hillman et al., 2009). RDT emphasizes the importance of resources – "resource needs, resource scarcity, and resource exchange among organizations" (Johnson, 1995, p. 20). Organizations are involved in dynamic interactions and evolving interorganizational relations while they manage their resource dependencies (Casciaro & Piskorski, 2005; Pfeffer& Salancik, 2003; Hughes, 2003). The theory's fundamental idea is that 'organizational survival hinges on the ability to procure critical resources from the external environment' (Hillman et al., 2009, p. 167), and that organizations are constrained by a network of interdependencies with other organizations (Pfeffer & Salancik, 2003). According to Pfeffer and Salancik (1978) the connections and interdependencies between organizations are

maintained through associations, legal and institutional rules and tools, supplier relationships and competitive behaviors.

RDT is used to explain how organizations reduce uncertainty and interdependence in their environments (Hillman et al., 2009). Organizations are involved in reforming their dependencies on needed resources by using tools and tactics to reduce uncertainties in the environment (Casciaro & Piskorski, 2005). Johnson (1995) mentions two strategies that are used by organizations to reduce uncertainty in their environments and address resource dependence concerns. These two are: buffering and bridging. Buffering involves protecting an organization's boundaries by stockpiling resources. While bridging on the other hand involves changing organizational boundaries via boundary spanning. This involves building strong alliances and partnerships with exchange organizations and suppliers and regulators. Interorganizational relationships such as alliances and agreements and joint ventures lead to "partial absorption of the interdependencies" (Hillman et al., 2009, p. 4).

Casciaro and Piskorski (2005) find the original RDT marred with ambiguities and they propose changes to the Pfeffer and Salancik's classic work on RDT. They come up with two dimensions of resource dependency: power imbalance and mutual dependence which were paired together in the original theory under interdependence. They argue that these two dimensions actually work in opposite directions, implying that mutual dependence actually helps to lead to inter-organizational action and collaboration, while power imbalance hinders mergers and collaboration.

Proposition 1: *Mutual resource dependencies between organizations facilitate collaborative response.*

Casciaro and Piskorski (2005) also recommend that the study of embeddedness of relationships between different entities is also important for interorganizational research. The authors suggest that patterns of interorganizational exchanges can be explained by resource dependencies and social-structural factors as well, and the use of social capital theory along with resource dependence will help to achieve this end.

Lin (2002) explores inter-organizational relationships from a resource dependence perspective in the context of crisis events. Ties have features such as: purpose, direction, content and strength. In crisis situations the purpose is to access resources. Directions will vary depending on the flow of resources, however, exchange of resources is involved but this exchange and the direction of exchange may not by symmetrical. Content of ties reflects the type of resource and nature of exchange, such as providing personnel or funds or information. The strength of a tie will be reflected through the frequency of interaction and close connection between entities (Lin, 2002). If viewed from the individual organizations perspective, when organizations face huge demands for resources, they rely on closer and stronger ties compared to their weak ties - this is in line with the bounded rationality view (Lin, 2002).

The idea of inherent power differentials caused due to unequal resource dependencies is important in the RDT (Hill & Jones, 1992). Power, rather than rationality and efficiency, and asymmetrical exchange, is used to explain resource dependency in organizations (Pfeffer & Salancik, 2003; Johnson, 1995), especially in the context of collaborative disaster response. It would be interesting to explore power and politics and how they influence interorganizational collaboration and ties in crisis situations (Lin, 2002).

A study by Choi and Kim (2007) study five bases of power and apply them to the local disaster management level, which are: structural power, resource power, actor power, cognitive power, and political power to understand the power dynamics within emergency management networks. Structural power relates to formal and informal positions. Informal power, as the authors describe it, comes from the interactions of actors with other actors in the network while formal structural power is derived from the hierarchical position one holds in the organization. The idea of resource-based power is directly in line with the resource-dependency theory and reflects the organizational and inter-organizational resource dependencies for survival and functioning of the organizations (Pfeffer & Salancik, 2003). Both power and control are closely linked in the resource dependence ideas as explained earlier. With important resources, an organization can both gain power and control of other organizations (Choi & Kim, 2007). Actor-based power reflects the management and coordination skills of managers and coordinators. Organizations which are focal in managing and coordinating the network and influencing its direction have actor-based power. Cognitive-based power is a collective process that builds internal legitimacy. Political-based power reflects organizational politics and the knowledge of where decision-making and negotiation power lies and which interactions are important to influence the network. There is interdependence and overlap within these power bases as well (Choi & Kim, 2007).

In terms of resource dependencies and resource exchanges, disaster response networks comprise of organizations from different sectors and levels of the government that rely on each other when faced with capacity constraints. From a vertical response perspective, local governments rely on the state government when they are unable to cope with disaster response

and relief. While, state level organizations rely on national and international sources of help when their capacity to respond is limited. At the horizontal level, a multitude of organizations from different sectors collaborate and pool resources to provide effective relief to disaster victims.

Proposition 2: *Power imbalances between organizations can both facilitate or hinder collaborative response*

RDT has not been able to fully explore inter-organizational relationships. RDT alone cannot explain the dynamic nature of power and dependencies in interorganizational relations and networks (Hillman et al., 2009). Other theories such as collective action and social capital theories contribute positively to a deeper understanding in the context of disaster response.

2.2.1.2. Institutional Collective Action Theory

The capacity for engaging in solving collective problems depends on the ability to resolve conflicts and arrive at integrative solutions when ideas and preferences of actors diverge (Kwon & Feiock, 2010). Cooperation and collaboration between entities takes place when the potential benefits from cooperating are high and the transaction costs are low. Transaction costs are costs that prevent institutional players to coordinate and cooperate to reach better decisions (Feiock & Scholz, 2010). Transaction costs are costs of negotiating, monitoring and enforcing a cooperative alliance or agreement (Feiock, 2005). According to Feiock et al. (2005) transaction problems and costs which are a function of community characteristics, political institutions and inter-organizational networks, hinder inter-local collaboration.

Proposition 3: *High transaction costs such as negotiating between entities and monitoring agreements hinders inter-local collaboration.*

The Institutional Collective Action (ICA) framework is a helpful tool to understand how different governments and entities cooperate and compete in decentralized governance systems (Feiock & Park, 2005). The institutional actors can be collective entities such as the local and state governments which if acting together can lead to beneficial outcomes that are preferred over individual institutional outcomes and results (Feiock & Scholz, 2010). According to the ICA Framework there are four factors which are important to understand costs and benefits of cooperative arrangements between local players. These four factors are: transaction costs for a good or service, the contextual characteristics such as demographics and social relationships of a community, the types of political processes and institutions in the community, and the structure of inter-local policy networks (Feiock, 2005).

The first factor deals with the characteristics of the good or service for which local players will coordinate. Cooperative results are easier to measure for services that are measurable such as water, whereas results are difficult to measure for police and fire services (Feiock, 2005). The second factor deals with a community's social, economic and political features that mold and signal the types of services and goods preferred through cooperation and the gains and costs of cooperation. Thus, players that enjoy similar community characteristics will have a common position of mutual dependence. Homogeneity of preferences between intra-jurisdictional players and different local agencies will increase opportunities for cooperation. The geographical distance between organizations also plays an integral role in determining whether agencies will be involved in repeat play and will develop strong interdependencies or not (Feiock, 2005).

The third factor which is political institutions is very important in determining the structure of incentives that would encourage local players to be involved in cooperative ventures (Feiock, 2005; Kwon & Feiock, 2010). For instance, local mandates, regulations and incentives by local administrators and officials will help in encouraging alliances and partnerships between diverse local players (Chenoweth & Clarke, 2009). According to Feiock and Park (2005), "the circulation of information on the benefits of joint action reduces uncertainty" (p.13) and will encourage cooperation between entities. Lack of information costs will also act as an impediment to achieve collective and collaborative solutions. According to Kwon and Feiock (2010) information costs include "costs of obtaining information on the range of possible institutional solutions, the resources of other actors, and the preferences of participants over the possible outcomes" (p. 878). Thus incomplete information obstructs the realization of benefits and gains from collaborative action.

Proposition 4: *Strong political institutions/mandates that encourage cooperative behavior lead to a stronger collaborative response.*

The ICA framework hypothesizes that the network between local agencies and organizations plays an integral role in the successful development of local alliances and partnerships (Feiock et al., 2005). Networks between entities are formed due to repeated interactions between different government units and departments (Feiock, 2005). In collective action problems these network structures will help to "facilitate efforts to overcome information negotiation and enforcement problems and facilitate inter-organizational learning" (Feiock, 2005, p. 27).

Scholz et al. (2005) describes the role of inter-local networks in solving collective action problems. They describe two types of network relationships. The first type are 'credibility clustering' relationships that are strong-tie relationships between organizations that increases the credibility of commitment of network players. The other type is referred to as 'information-bridging' and relies on weak ties and relationships between different organizations that share information to solve the collective action problems. Similarly, there are two conflicting views on how informal relationships will enhance chances of collaboration. The first view focuses on closure and embeddedness of relationships between players that share similar ideas and views (Burt 2000; Coleman 1988). The other view is based on networks and the structural holes theory (Burt, 2004).

According to the first, traditional view, cohesive ties and network closure helps to develop and sustain social capital through trust building, relationship-building and cooperative exchanges. Network closure is believed to sustain relationships and decrease uncertainty of dependencies and exchanges (Gargiulo & Benassi, 2000). Transaction costs can diminish because of social capital (Feiock et al., 2005). Pre-existing cooperative relationships between entities builds social norms and develops social capital which makes joint action easier (Kwon & Feiock, 2010). According to Ostrom (1998) trust amongst local government leaders and a shared identity reduces the costs of a collective action problem. Overtime, repeated interactions between players will increase the credibility of their commitments and will develop a reciprocal and trusting relationship between entities which will hinder chances of deflection and opportunism (Feiock, 2005). These repeated relationships will also reduce uncertainty and transaction costs (Ostrom, 1998).

Structural hole theory (Burt, 1997), on the other hand, proposes another relationship between social capital and network structures. The theory proposes that the diversity in players and information within a network actually contributes to brokerage opportunities since there are weak links between clusters of organization within a non-cohesive network. Thus, embeddedness in networks will actually hinder organizational coordination and cohesive ties will pressurize manages to reciprocate exchange of resources. The high level of cohesive ties and familiarity with partners decreases availed opportunities of forming newer relationships that address uncertainties in the environment in better ways. Gargiulo and Benassi (2000) refer to this as 'relational inertia'. Thus, the lack of structural holes hinders flexibility and agility required to respond to uncertainties in the environment.

Scholz et al. (2008) suggest and hypothesize that an actor will prefer dense and embedded relationships when credibility of commitment acts as a major obstruction to collaboration. This will help to reduce enforcement costs and solve problems of credibility. Whereas an actor will prefer centrally located positions when searching for collaborative ventures and opportunities serves as a major obstruction to successful collaboration. Figure 1 compares the two types of relationships.

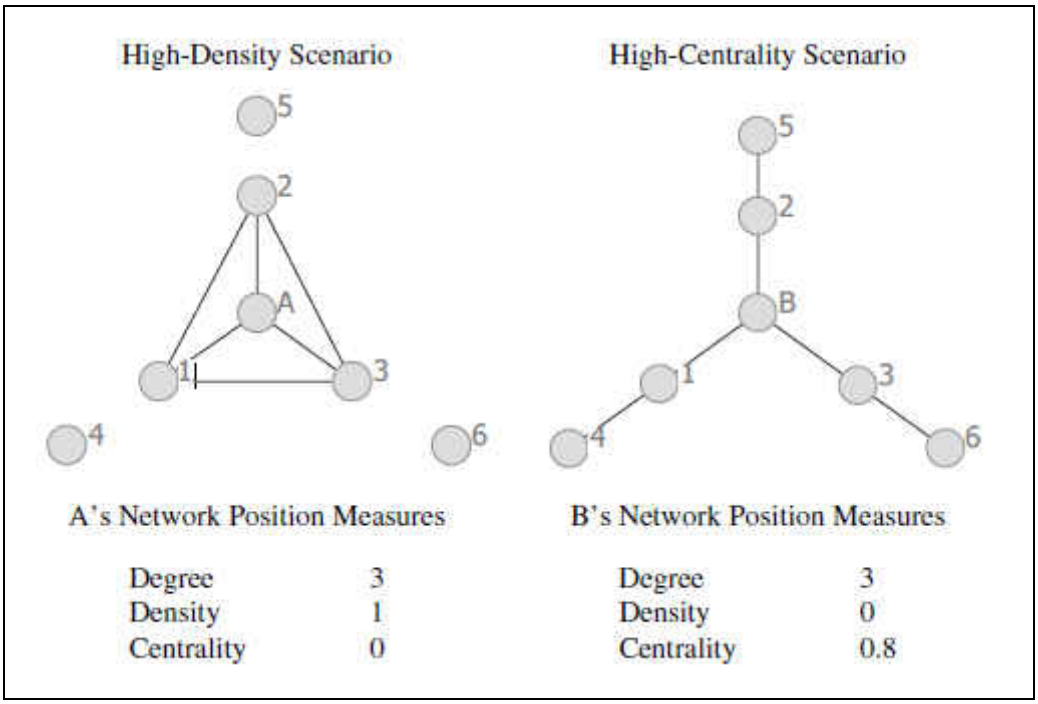

Figure 1 High Density vs. High Centrality Scenario (Scholz et al., 2008, p. 395).

The application of the ICA framework is common to inter-local and regional agreements and economic development partnerships (Feiock, 2005; 2009; Feiock et al., 2005; Feiock & Park, 2005), but is fairly uncommon to disaster and emergency management. However, its relevance and application to collaborative disaster response should not be overlooked and needs to be explored.

Effective collaborative response in disasters demands high performance from diverse actors operating at the local level and poses a clear collective action problem. Research on creating local capacity to manage disasters and creating resilient communities, proposes that local organizations should cooperate and collaborate. However, in order to realize the gains to cooperation and collaboration, these organizations are faced with collective action problems. Even if organizations enter into agreements, there is opportunity to deflect and become

complacent. Building capacity for collective action in disasters and in regions vulnerable to threats involves strong social organizational support and technical investment (Comfort & Haase, 2006).

Nested institutions, local resources and governance networks and institutions are all important in developing an effective local response (Chenoweth & Clarke, 2009). Also since local agencies and governments have uneven capacities and capabilities and disaster events create uncertain conditions, networks are needed to ensure collaboration and cooperation between multiple entities (Agranoff & McGuire, 2001). However, these networks and partnerships between agencies are not free from political and institutional influences, as discussed by the ICA framework.

2.2.1.3 Social Capital Theory

The study of social capital provides theoretical insights that explain behavior such as human actions especially collaboration in terms of trust, networks, and norms (Bartkus & Davis, 2009). From a theoretical perspective, social capital can be applied to different levels and units of analysis such as individuals, organizations, and communities. It can also be applied to the study of interrelationships between these different levels of analysis (Nahapiet, 2009). This particular research focuses on the organizational and network level of analysis as collaborative response of organizations and disaster networks are being studied.

According to Bartkus and Davis (2009), "social capital represents the resources that arise from relationships and that can accrue to either the individual or the collective" (p. 2). Nahapiet and Ghoshal (1998) define social capital as 'the aggregate of resources embedded within,

available through, and derived from the network of relationships possessed by an individual or organization' (p. 243). Ostrom (2009) defines social capital as a 'set of relationships among members of a group and the values that they share that enable them to solve collective problems' (p. 21). There are a multitude of definitions of social capital that exist across various disciplines and according to Ostrom (2009) most of them emphasize two assumptions: "social capital is a resource that is available to members of a social network, and social structure is often the type of capital that all members of a group can access to promote their interests" (p. 17).

Most researchers define and conceptualize social capital in two ways: relationships structure and relationship content. The structural aspect deals with the network size, the density of relationships, etc and the content aspect deals with the value-laden side of relationships involving norms and institutional values. Thus, it is important to explore both aspects for realizing the full impact of social capital (Bartkus & Davis, 2009). Social capital is not a one-dimensional concept. The structural dimension of social capital is the most well researched area. The structural pattern of ties and relationships are studied in terms of bridging and bonding behavior and closure and brokerage strategies along with network centrality measures. Many studies show that actors in central positions within networks will be able to access external resources (Nahapiet, 2009). The relational dimension of social capital focuses on trust and the conditions it creates foster cooperation (Nahapiet, 2009; McEvily et al., 2003). Moreover, social capital and its types do not have a universal definition, they have to be tailored to the context and nature of the problem which is being tackled (Ostrom, 2009). Thus, when social capital is being explained in terms of norms and institutions, it needs to be tailored to the collective-action problem and context at hand.

Many scholars apply social capital theory to the study of social networks. In fact newer definitions of social capital incorporate the role of social networks and approach the issue from the networks perspective (Brass, 2009). According to Helliwell et al. (2009), social capital is defined as "networks together with shared norms, values and understandings that facilitate cooperation within or among groups" (p. 87). Thus, focus seems to be more on the network of relationships and their patterns and content rather than the attributes of the actors (Brass, 2009).

Two strategies through which social networks develop social capital are brokerage and closure. These both may also be referred to as network forms of social capital (Burt, 2009; Brass, 2009). "Brokerage involves building connections across groups to increase exposure to diverse opinion and practice", while "closure involves strengthening connections within a group to focus the group on a limited set of opinions or practice" (Burt, 2009, p. 39).

The brokerage form of social capital deals with the advantages network players and entities will be exposed to when they build relationships across structural holes. Thus brokerage will be measured by coordinating avenues and opportunities provided by structural holes in a network. Network brokers are those that connect players across structural holes. Thus, brokers would be those entities within a network that have relations with distinct groups and help to bridge those distinct and disconnected groups to develop opportunities to enhance performance or solve collective-action problems (Burt, 2009). Brokerage as a viable strategy is relevant to extreme situations or situations with a high degree of uncertainty, where new relationships have to be developed and explored to solve problems.

Closure, as a form of social capital is measured by the "extent to which everyone in a network is connected to everyone else" (Burt, 2009, p. 46). This kind of network is relevant for

coordinating work. Embedded ties between entities fosters' trust and sets expectations for reciprocal behavior which increases cooperation and sharing of resources (Nahapiet, 2009). In social capital literature, reciprocity is the governing principle of exchange and is closely linked to trust (Nahapiet, 2009).

Proposition *5: Organizations that have embedded and pre-existing relationships with each other and enjoy a high level of trust tend to collaborate together effectively and timely.*

Therefore, according to Burt (2009), "social capital is an intersection of two functionally distinct networks: a 'differentiating' network in which people are distinguished by skills and resources, and an 'embedding' network in which people with complementary skills…to better pursue their interest" (p. 60). Burt's work is important as it covers the structural aspects of network connections (Fishman, 2009). However, it is imperative to analyze social ties not solely from their location in network structures but also through their relational content and value (Fishman, 2009).

It is interesting to note that many social capital researchers utilize the collective-action framework to structure and outline their study problems (Ostrom & Ahn, 2003). Ostrom and Ahn (2003) also utilize and understand the important links between social capital and collective action theory and propose three forms of social capital that are important to explore when studying collective action. These three forms of social capital are: 1) trustworthiness, (2) networks, and (3) formal and informal rules or institutions. These forms of social capital help to determine the success and effectiveness of the collective action.

The intrinsic values of trust and reciprocity are important for behaving collaboratively and cooperatively for collective action. Networks, as discussed earlier, both in the context of the collective action theory and social capital theory are relevant and viable forms of social capital. Institutions as a form of social capital help to foster cooperation by enhancing shared norms of trust and reciprocity (Evans, 1996; Ostrom, 1998, 2009).

Institutional rules can influence 'behavior directly by establishing mechanisms of rewards and punishment or indirectly to help individuals govern themselves by providing information, technical advice, alternative conflict resolution mechanisms, and so forth' (Ostrom & Ahn, 2003, p. xviii). Formal and informal rules both come under institutions. According to Grootaert (1998) social capital includes formal institutions, the rule of law, governments, courts, etc. Some scholars suggest that formal institutional forms may not be effective methods or tools to resolve collective action problems. However, Ostrom, and Ahn (2003) suggest that formal institutions such as a well-structured government, government officials and agents, courts and rule of law are important sources that help to deal with collective problems. Values of trust and reciprocity will be influenced by the type of rules within a group of organizations and within a community that may be set by a polity (Ostrom & Ahn, 2003). However, literature does show that informal rules and working rules that are developed and formed by participants in a self-governing network or system seem to be more effective and sustainable.

Proposition 6: *Strong institutional support (both formal and informal) that encourage cooperative behavior lead to a stronger collaborative response.*

All in all social capital theory is becoming a valuable theory of cooperation as it provides insights about collaboration and networking advantages. Researchers are now beginning to

realize social capital's potential and application to complex and situations marred by uncertainty (Nahapiet, 2009). Research and theoretical views have arrived at the view that social capital is a valuable collective resource which is developed or contained in social connections and social networks that connect interdependent players together (Kramer, 2009).

2.2.1.4. Network Structure

Network analysis is a popular tool that is being used to study structural relationships between organizations within networks. Although many studies have explored the structural aspects and measures of networks, very few studies have aimed to link them to overall effectiveness of the network (Milward & Provan, 1998). Network analysis helps to identify the structure of the network, the communication lines and information flows, identify central players and peripheral players and also helps to explore the weak links and strong links within the network. It helps to identify the density of relations and preferred cliques and subgroups within a network as well. However, the challenge of connecting the various measures and analytic results to network effectiveness remains a difficult terrain to explore (Kapucu & Demiroz, 2011).

There are some structural aspects that help to examine networks at the organizational or egocentric level, and there are some that depict network-level qualities and outcomes. Centrality measures reflect organizational and egocentric qualities in the network (Provan et al., 2007) and are valuable measures that explain how much social capital exists, flows and develops within a network (Furst et al., 2001). Popular centrality measures utilized in research are explained below:

Degree Centrality: The measure of degree centrality shows the number of direct links an organization has with other organizations in the network. In-degree centrality measures links that

flow to an organizations and out-degree measures the links being sent out to other organizations (Provan et al., 2007). Degree centrality reflects how much social capital is directed to individual nodes. An agency with high degree centrality reflects high level of embeddedness in the network (Furst et al., 2001) and the higher the degree centrality of an actor the more powerful and influential it is in the network (Analytic Technologies, 2008). Usually in emergency networks the coordinator agency is the one with a high level of degree centrality and positional power (Kapucu & Demiroz, 2011). Players with a high level of degree centrality will have many relations with other agencies and will have access to many resources and sources of information (Rowley, 1997). These actors will be viewed as influential members of a network that mobilize the overall network and its functioning but this requires a lot of energy, burden and capacity to maintain the large number of ties (Prell et al., 2009).

Closeness Centrality: Closeness centrality considers the shortest path of connecting a focal organization to any other organization within the network. Closeness centrality considers indirect connections as valuable connections for exchange and flow of information and resources (Provan et al., 2007). High closeness centrality shows that a player has the shortest aggregate distance/path to all other actors within the network. This reflects low dependence on brokers and intermediaries. Also high closeness reflects that an agency can spread information and send resources quickly and easily throughout the network (Rowley, 1997).

Betweeness Centrality: Betweeness centrality depicts circular and closed relational patterns (Furst et al., 2001). Betweenness centrality is also another very important structural measure that shows how an organization's/individuals position lies between others within the

network. Intermediary and gatekeeper roles and agencies can be identified through this measure (Provan et al., 2007). A high betweeness centrality score shows that all actors must go through this organization to access resources and communicate as this organization will have a large control over actors and resource flows (Rowley, 1997). According to Kapucu and Demiroz (2011) a high mean measure of betweeness is not positive for emergency response networks as there is a high chance of breakdown of communications between subgroups and different actors of the network.

Examining and studying whole networks (multiple organizations with multilateral ties) provides information about how networks have evolved, how they are managed and how collective goals are reached. Thus, network-level structural aspects, measure the overall network outcomes. Centralization or density of a whole network would influence network outcomes such as overall sustainability of the network and the development of capacity of the network to achieve its goals (Provan et al., 2007). The following structural measures are important in influencing overall network effectiveness.

Network Density: Density of the network measures overall connectivity among agencies in the network. What level of density is effective for achieving the goals of the network? Density is measured as a ratio between the existing number of ties that link actors together and the total number of possible ties when each node were tied to every other node within a network. As density in the network increases, information exchanges and communication flows in the network more efficiently. However, when density may be low a network will be sparsely connected, containing isolates and cliques which will restrict overall communication flows and

information and resource exchange within the whole network (Rowley, 1997). However, higher density would put coordination strains on network members which may have varying capacities to coordinate and collaborate (Provan et al., 2007). A density score of 1 shows that all actors in the network are directly tied to each other and a density score of 0 shows a highly dispersed and fully disconnected network (Prell et al., 2009).

Network Centralization: Centralization or decentralization reflects whether the network is structured in a way that few organizations are centrally located (like a hub-and-spoke network) or in a dispersed fashion where links are spread out more evenly throughout the network (Provan et al., 2007). According to Furst et al. (2001) hierarchical networks with few central actors having high social capital may prove to be less productive and innovative as they only have the ability to combine limited resources from limited actors. Interpretation of centralization shows that a score of 0 implies a fully connected network, where all actors are directly connected to each other (Prell et al., 2009).

Network Power: The concept of network power is linked very closely with the concept of network centralization. According to Agranoff and McGuire (2001) power in networks can both inhibit and facilitate collaboration. They recommend studying the role of power in network effectiveness. If some actors within a network do not have the capacity, status and resources to contribute equally with other actors, then the network management process will be manipulated or lead by stronger, more powerful, central actors (Ansell & Gash, 2007).

Structural Holes: Fragmentation and structural holes within the overall network will also reflect important aspects of the overall network. Structural holes depict fragments of

unconnected organizations and loose connections to clusters and cliques within the network (Provan et al., 2007). Holes and weak ties are important since diverse information and new innovative ideas flow through them and actors within the network can access diverse and varied pools of information and resources (Prell et al., 2009).

Cliques: Cliques are clusters that show cohesive, strong ties between three or more organizations. The overall clique structure of a network also helps to identify how many cliques exist and which types of agencies are involved (Provan et al., 2007). Overlaps in cliques and multiple subgroups need to be considered as they indicate the element of multiplexity that promotes relationships of trust and stability (Furst et al., 2001). Multiplexity shows how one organization may have multiple relationships and links with other partners and even if one link breaks, the other links keep the relationship sustainable. Thus, both organizational level measures and network level measures can be used to analyze whole networks and their operations.

As suggested earlier, two types of measures can be used: ego and network measures. Similarly, two types of different analysis will determine whether ego measures may be employed or whole network measures are utilized. Thus, the type of research and variables being studied , as shown in Figure 2, will determine what measures are appropriate for analysis. When studying network governance and addressing collective problems, it is important to study both bilateral dyadic relationships and multilateral ties that reflect whole networks (Moynihan et al., 2012).

Table 1Typology of Interorganizational Network Research (Source: Provan et al., 2007, p. 483)

	Dependent Variable/Outcome	
Independent Variable/Input	**Individual Organizations**	**Collectivities of Organizations**
Organizational variables	Impact of organizations on other organizations through dyadic interactions	Impact of individual organizations on a network
Relational or network variables	Impact of a network on individual organizations	Whole networks or network-level interactions

Robins et al (2011) analyze a networked governance system and propose certain structural aspects of networks as preconditions for the effective governance and performance of networks. According to their research relational and structural embeddedness and agreement of goals and actions amongst network players are integral for effective network governance. They argue that certain structural properties and configurations of networks can lead to, inadequate and sub-optimal performance and results. They claim that the right structure of a network is a necessary condition for effective performance. The next section deals with network performance and effectiveness.

2.2.1.5 Network Effectiveness

Interorganizational networks have become commonplace for delivering and managing services, however the assessment and evaluation of effectiveness remains to be a difficult endeavor. Provan and Milward (2001) suggest that evaluation should be a multi-tiered process and should contain three levels of analysis: community, network and organization/participant levels. At the community level indicators such as cost to community, developing social capital,

public perceptions should be considered as effectiveness criteria. At the network level membership growth, range and duplication of provision of services, multiplexity, sustainability of the network should be considered. At the agency/organization level resource acquisition and access, survival of agencies, cost to agencies, etc may be considered. Depending on the goal and mission of the network, an appropriate effectiveness criteria can be developed at each level.

Proposition *7: Membership growth, range of services/diversity, duplication of provision of services, and multiplexity of relationships affect overall network effectiveness/collaborative effectiveness.*

Effectiveness of networks has been operationalized in different ways by different scholars. Very few studies have explained network structural properties and linked them to effectiveness of networks (Provan & Sebastian, 1998). Different collaboration structures and the nature of tasks are believed to contribute to the effectiveness of networks (Bryson et al., 2006). Krebs and Holley (2002) define effective networks to have certain characteristics such as: homophily exists within the network (common goals, common attributes, and shared governance structures link nodes together); element of diversity is integral to develop and sustain connections and links to diverse nodes and groups for innovative results; robustness of networks exists (several paths between nodes exist) so that when information flows and communication channels are disrupted between certain nodes, the network and communication channels still exist and connect nodes; shorter average path lengths exist (quick and accurate processing of information) in the network with the power of indirect connections and ties (the connection of two nodes through more than one intermediary); and strong hubs (nodes with multiple direct

connections for dispersing timely information), brokers (nodes that act as liaisons and connect disconnected parts of a network) and boundary spanners (nodes connecting two or more groups/clusters and essentially serving as bridges) exist in the network to make it functional, growing and sustainable.

Similarly, Robins et al. (2011) also suggest that an effective network requires structures that facilitate the development of trust and collaboration between entities and agreement on shared goals. Informal ties and relationships are bound to develop around the formal network structure that is prescribed through legal documents or mandates. They also suggest that structural properties such as: "the presence of reciprocation in network exchanges, indicating relational embeddedness; and the presence of triangulated exchanges, indicating structural embeddedness" (p. 1297) are important preconditions for effective performance of networks.

Proposition 8*: Structural features such as robustness within the network, shorter average path lengths, strong hubs, brokers and boundary spanners contribute positively to overall network effectiveness/collaborative effectiveness.*

Some studies focusing on mental health policy networks reflect that networks centralized around lead organizations are more effective compared to highly dense networks (Provan & Milward, 1995), and another study concludes that strong cliques within networks play an important role in achieving the overall goals of the network (Provan & Sebastian, 1998). Kapucu and Demiroz (2011) evaluate the performance of emergency response networks by exploring the structural aspects of the network. However, they suggest that this kind of analysis is possible when a planned network structure for response exists with which the actual response

network may be compared. Thus, it is important to explore which structural configurations enhance effective collaborative response in disasters.

Visual assessment and analysis of networks helps to understand the pattern of relationships between members of a network. Identifying central players within a network help to see where information and decision-making power lies (Cross et al., 2002), and how that be altered or enhanced to strengthen the effectiveness of response. Moreover, identifying peripheral players within a network and developing ways to engage and connect them in better ways so that expertise, skills and resources within the network are utilized in a better and effective way is also very important. Also identifying points and nodes within a network that show functional and operational fragmentation (through sub-groups) can provide important information about the network and its performance. Thus, social network analysis can be used as a diagnostic tool for identifying patterns of relationships in a network and how these relationships can be improved to increase overall effectiveness of a network (Cross et al., 2002).

2.3 Conceptual Framework

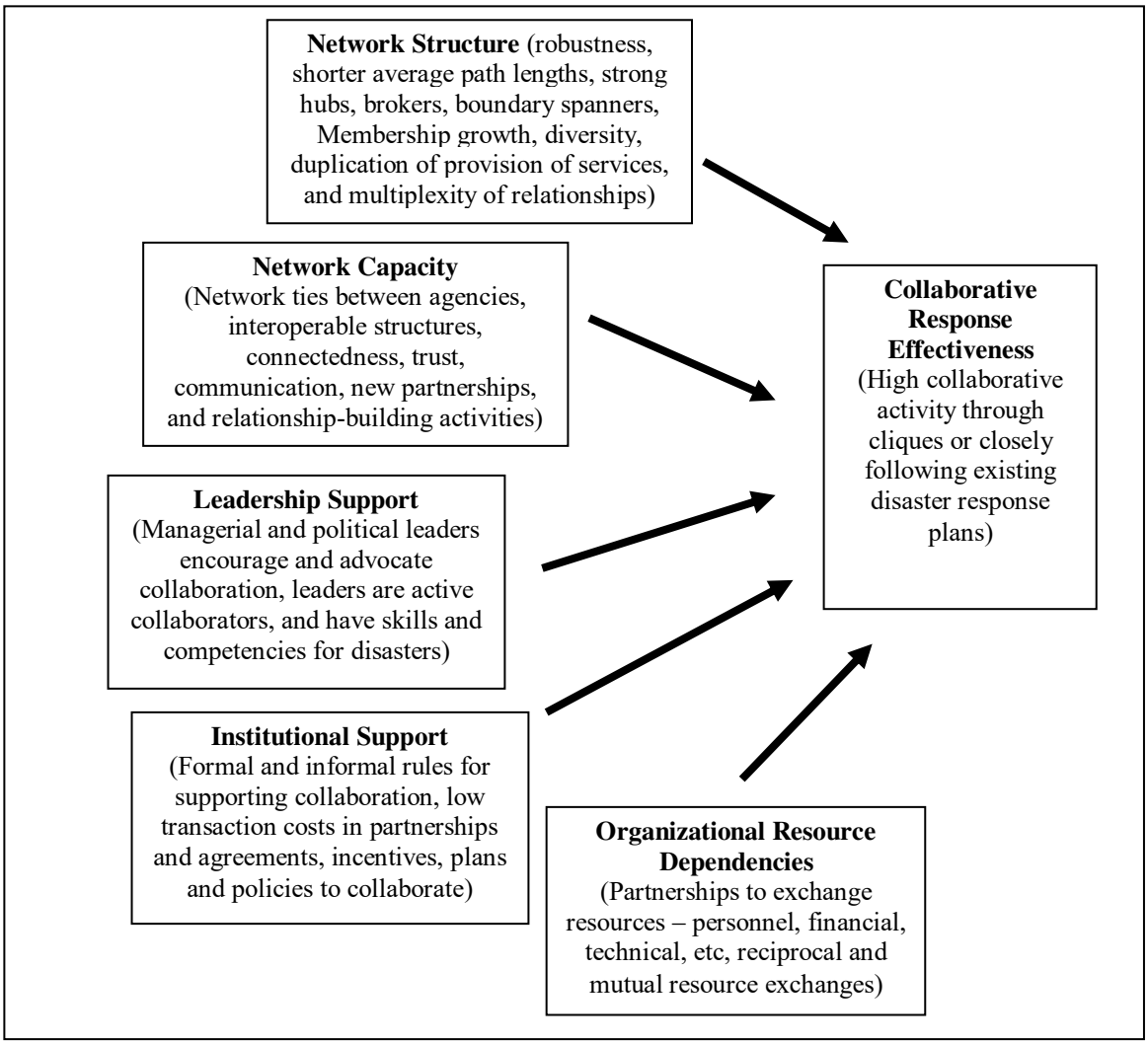

Figure 2 Conceptual Map for Inter-organizational Collaborative Response in Disasters

The conceptual map in Figure 1 integrates the study hypotheses, the literature findings and the theoretical views discussed in the previous section. The conceptual framework hypothesizes that collaborative response effectiveness in disasters is a function of and is influenced by the structure of a response network, networking capacity of responding organizations, the leadership support provided by political and government leaders and

organizational leaders to encourage and lead efforts that involve collaboration in disaster response, the institutional support (both in the form of formal and informal processes and rules) and the inter-organizational resource dependencies.

Network structure reflecting robustness, multiplexity, diversity and range of services provided, and membership growth all influence overall collaborative effectiveness of the network. Networking capacity is an important and major influential factor contributing to collaboration and response effectiveness is derived from the Social Capital Theory and the Institutional Collective Action Theory. Both theories emphasize the importance of trusting and pre-existing relationships between stakeholders and organizations that will collaborate to solve collective action problems. Institutional support as an important construct in the conceptual framework is derived through the political institutions and their role in the Institutional Collective Action (ICA) Theory and institutions as a form of social capital in the Social Capital Theory. Organizational resource dependencies as an important and foundational construct has been developed directly from the Resource Dependency Theory. Moreover, last but certainly not the least, leadership support as an integral concept and construct in the study has been briefly touched in the theoretical perspectives presented but is more pronounced in the disaster management literature as reflected through this chapter.

2.4 Hypotheses

The hypotheses derived from the literature review and theoretical propositions are as follows:

Hypothesis 1: *Network structure influences overall effectiveness of response networks.*

There have been several studies that have studied the structure of individual teams and have concluded that network structure helps or obstructs performance and effectiveness. Mostly research has concluded that dense interpersonal ties and relationships help to achieve goals in a better way (Balkundi & Harrison, 2006). Theoretically speaking, this conclusion makes sense but does this translate in situations where the team or network is comprised of different players who come together for a short span of time to meet specific goals and are faced with time constraints and capacity constraints. What type of network structure is ideal for disaster response? A cohesive network or one with structural holes, or simply a mix of both depending on the functional and operational requirements of the network at a specific point in time. Some research also suggests that the most resourceful and powerful players should employ central positions in the network so performance can improve. However, this may be constrained by the absorptive capacity or capabilities (Tsai, 2001) of the neighboring agencies in the response network.

Hypothesis 2: *Networking capacity of organizations positively impacts collaborative response effectiveness.*

Collaborative capacity has been understood as the ability to successfully engage with different agencies and has been driven by various factors such as the mind-set of those managers involved in the collaborative process and the techniques and strategies applied in the process to achieve ends (Weber & Khademian, 2008). Foster-Fishman et al. (2001) define levels of collaborative capacity as a – member capacity, relational capacity, organizational capacity and programmatic capacity. When operationalizing networking capacity, the element of interest in this study is the relational capacity between agencies that is depicted through the strength of ties between agencies, and according to social capital theory, the level of trust between agencies

(Nahapiet, 2009). Both types of exchanges between members of the network and the level of trust between them influences the collaborative capacity (Weber et al., 2007), or the networking capacity of members. Programmatic collaborative capacity and achieving the goals of a collaborative arrangement will also be influenced by the level of interoperability that exists between agencies.

Hypothesis 3: *Leadership support positively impacts collaborative response effectiveness.*

This hypothesis is developed through the literature on multi-level disaster response. All three levels – National-International, Provincial, and local level response identify leadership – either political or organizational as an important factor in mobilizing an effective response. Also media pays a lot of attention to what roles prominent leaders are playing in the initial response. Are UN leaders making the right kind of appeals? Are government leaders on board and actively participating in ground relief operations? Thus, this is an important dimension to explore in the study.

Hypothesis 4*: Institutional support positively impacts collaborative response effectiveness.*

Through the literature and through the ICA framework it has been established that the type and nature of institutional rules and policies can either facilitate response or make the mobilization of effective relief and response more cumbersome and problematic. ICA theory identified transaction costs in partnerships and agreements to play an important role in determining the outcomes of collaborative activity. Thus, institutional support can take the form

of formal plans and policies in place, the creation and effective management of appropriate funds for quick mobilization of relief goods and services, arrangements such as relaxing visa requirements for international relief teams all fall under the type of institutional support available.

Hypothesis 5: *Organizational resource dependencies positively impact collaborative response effectiveness.*

In terms of resource dependencies and resource exchanges, disaster response networks comprise of organizations from different sectors and levels of the government that rely on each other when faced with capacity constraints. From a vertical response perspective, local governments rely on the state government when they are unable to cope with disaster response and relief. While, state level organizations rely on national and international sources of help when their capacity to respond is limited. At the horizontal level, a multitude of organizations from different sectors collaborate and pool resources to provide effective relief to disaster victims.

Proposition 7, 8 and 9 are integrated in Hypothesis 1 since they all deal with the structural aspects of networks. Proposition 5 is reworded as Hypothesis 2 as networking capacity is operationalized to depict the strength of ties between agencies, the level of trust between agencies. Alongside proposition 5, the discussion on interoperability of systems in agencies in the literature review section is also part of the Network capacity construct. Hypotheses 3 is derived from the literature review of leadership in disasters literature. The theme and importance of leadership and political support has been prevalent in all three stages of governance (local,

state and national, and international). Thus, hypothesis 3 identifies leadership and political support to positively impact collaborative response. Proposition 3, 4 and 5 are integrated in Hypothesis 4 that hypothesizes the relationship between institutional support and collaborative response. Last but the least, proposition 1 and 2 are integrated under hypothesis 5 that deals with organizational resource dependencies.

2.5 Summary

A collaborative response ensures that services are delivered to disaster victims in a timely and effective manner (Robinson et al., 2006). Coordination in response helps to avoid duplication by pooling resources from different organizations and across sector boundaries (Kapucu, 2008). Disaster management literature shows that a lot goes into ensuring that a collaborative and effective response is achieved in disaster events. Pre-disaster plans and policies, trust and pre-existing agreements and memorandums of understanding between responding agencies across horizontal and vertical jurisdictions, the clarification and understanding of roles and responsibilities, the sharing of resources and mutual exchange before and during disasters, and strong interoperable communications and information exchange between entities are some of the reasons found in literature that influence effectiveness of disaster response. Moreover, the literature also highlights the importance of leadership both at the higher political and elected level and the organizational and managerial level. Leadership is an important dimension to explore in disasters and the next chapter will address this dimension along with other dimensions in the context of the Pakistan Floods of 2010. The literature and the theoretical framework developed through theories and study hypotheses shows that collaborative

response effectiveness in disasters is a function of network structure, networking capacity of responding organizations, institutional support, leadership support, and organizational resource dependencies and exchanges. The following chapter will provide an overview of the disaster management system in Pakistan along with the overview of the scale and consequences of the Floods of 2010.

CHAPTER THREE: CONTEXT OF THE STUDY

This chapter provides the background information on the case of the Pakistan Floods of 2010. [1] This chapter also describes the disaster management system in Pakistan and outlines its path of development since Pakistan's inception in 1947. The disaster management system outlines the formation and leading role of NDMA and the important role MLAs such as the United Nations (UN), through its cluster approach have played in recent disasters within the country. The Armed Forces in Pakistan also play a forefront role in the disaster response and relief landscape and this chapter provides a brief overview of their role in recent disasters in Pakistan. The chapter also briefly discusses the development of the 2010 National Response Plan and identifies key partners in managing disasters. While discussing the role of NDMA in overall disaster management, the provincial and district disaster management structure in the province of Punjab are also described.

3.1 Hazards and Vulnerabilities in Pakistan

Pakistan is a country that faces great threats posed by manmade and natural disasters. Natural disasters such as floods, earthquakes, landslides, avalanches, drought, and cyclones

[1] Part of this chapter is being published as a book chapter. The reference for the book chapter is: Khosa, S. (2014). Re-development, recovery and mitigation after the 2010 catastrophic floods: The Pakistani Experience. In N. Kapucu, & Tom, K. L (Eds.), *Disaster & Development: Examining Global Issues and Cases.* New York, NY: Springer

along with threats caused by civil conflicts, terrorism, health epidemics, oil spills, urban fires, and challenges associated with a high number of internally displaced populations (IDPs) occur quite frequently in the country. Pakistan lies on a seismic belt and as a result experiences earthquakes pretty often but of small magnitude. Pakistan's long coastline also increases its risks to potential tsunamis and cyclones (Khan & Khan, 2008). Pakistan is also one of the top ten countries in Asia that will suffer due to climate change (Amir, n.d.).

Khan and Khan (2008) suggest that floods are one major hazard "against which an effective protection network of dykes and flood water regulatory infrastructure has been built over the years" (p. 9). Prior to the large-scale, unprecedented devastation caused in the 2010 Floods, flood events of 1950, 1992, and 1998 have been massively destructive as well.

According to Khan and Khan (2008) floods have hit all provinces ranging from riverine flooding to flash floods and landslides in both mountainous northern areas and flat areas in the provinces of Sindh and Punjab. In Pakistan floods happen regularly in the monsoon months from July to September. These floods originate from the Bay of Bengal and pass through lower central India into the northern parts of Pakistan. The mountain ranges in the north of Pakistan help as a recurrent source providing inflow to rivers (Khan & Khan, 2008). The next section lays out the specifics of the existing disaster management system in the country.

3.2 Disaster Management System in Pakistan

In Pakistan the approach to managing disasters has largely been reactive. The long-term vision of managing and mitigating disasters is not in place but rather a management style dealing with quick-fixes is applied (Khan & Khan, 2008). After every disaster resources are utilized for relief and recovery efforts rather than employing risk reduction and mitigation strategies. The

disaster management system and the structure in Pakistan is three tiered - divided into national/federal, provincial/state, and district/local levels.

3.2.1National-Level Disaster Management

In October 2005 Pakistan experienced one of its worst natural disasters – a 7.6 magnitude earthquake that resulted in the death of 80,000 people and loss of 3.5 million of people's dwellings (Khan & Khan, 2008). Prior to the 2005 Earthquake in Pakistan, no single central organization was responsible for overlooking and mobilizing disaster response and relief efforts. By far the most important and pivotal institutional change came about after the massive destruction caused by the 2005 Earthquake. The National Disaster Management Authority (NDMA) was created in 2006 (Zaidi, 2012). Thus, the 2005 earthquake served as a 'focusing event' for Pakistan and led to new legislation and the creation of a central body to manage disasters. Ordinance No XL of 2006 was issued by the government which set up a body for oversight and developing disaster management policies and plans called National Disaster Commission. This body was chaired by the Prime Minister. Alongside, this ordinance also set up the NDMA and its provincial branches to implement plans and policies and coordinate disaster management and response efforts (Young et al., 2007).

The NDMA in Pakistan is the central body responsible for leading and coordinating disaster preparedness, response, and recovery efforts by different organizations which include different government departments, international agencies and donors, and the military. NDMA is also required to activate the National Emergency Operations Centre (NEOC) during the response phase of managing a disaster.

NDMA is tasked to coordinate the response of the federal government and can request any government department or agency to mobilize resources immediately. During response it is required to provide information about the initial assessment and damages that have been caused and issue situation reports to the Prime Minister, Provincial Disaster Management Authorities (PDMAs), and Armed Forces. The NDMA plays an important role in coordinating activities with the provinces as well. It is required to collect and gather information from the PDMAs on the damages and needs assessments so it can quickly arrange for the required relief goods. The agency is also tasked to provide a complete assessment of damages and needs for recovery and reconstruction so that relevant multi and bilateral donors and agencies such as UN agencies and INGOs can support response and relief efforts (National Disaster Management Authority [NDMA], 2010).

Thus, NDMA, according to the National Disaster Response Plan of 2010, plays an important role in a number of response operations and functions. The Figure 3 below depicts the roles, links, interactions and partnerships of NDMA with other agencies. The NDMA plays a leadership role in coordinating response and relief efforts and is tasked to develop working relationships with line ministries and departments, international agencies, and provincial level agencies and departments (NDMA, 2010).

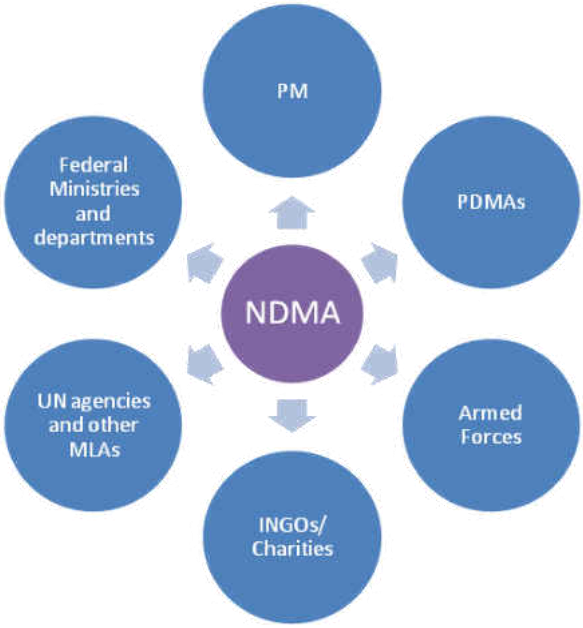

Figure 3 NDMA and Key Partners in the Planned Response System

In addition to NDMA, the Economic Affairs Division (EAD) is tasked to coordinate humanitarian donations (Kronstadt, Sheikh, &Vaughn, 2010). There is also Federal Flood Commission (FFC) which is responsible for flood risk management and for developing and implementing a National Flood Protection Plan and providing timely forecasts and warnings in case of a disaster. The policy creation organization for risk management is the National Disaster Management Commission (NDMC) (ADB, 2010).

3.2.2 Provincial Disaster Management

Just like the disaster management structure in the United States has state and local level emergency management organizations, in Pakistan there are Provincial Disaster Management Authorities (PDMAs) at the state/provincial level and there are some District Disaster Management Authorities (DDMAs) at the district/local. All provinces in the country have

established PDMAs, but not all districts in the country have DDMAs. Only those districts have established DDMAs that have local capacities and capabilities to develop and operate them (ADB, 2010).

During the Floods of 2010 not all provinces had a fully functional PDMA as well. Punjab had not developed a fully functional PDMA in line with the 2007 NDMA ordinance. It was during and after the floods that the PDMA was fully developed and became functional. Although PDMA was not formally established in the province, a Flood Relief Commission had been established in the Punjab Province. The provincial government headed by Chief Ministers is active in disaster response and relief efforts along with provincial departments such as Provincial Departments of Health, Irrigation, and other relevant departments.

The PDMA, according to the 2010 National Disaster Response Plan is tasked to activate the Provincial Emergency Operation Center (if one exists), or any appropriate regional emergency operations center. The provincial agency is also tasked to provide early warnings to relevant agencies and stakeholders along with launching an early response. The provincial body is required to carry out situation and damage assessments and respond in a relevant manner (NDMA, 2010).

The PDMA also plays a liaison role connecting the DDMA with the NDMA. It identifies the needs and damages at the district level through DDMAs and shares this information with the NDMA and plans accordingly to mobilize resources and relief goods. Apart from planning and damage assessment, the agency plays the direct role of providing food and non -food items (NFIs) to the impacted regions. It also coordinates closely with the provincial departments, the NDMA, and the Armed Forces. The Authority also networks with the INGOs and NGOs, UN

agencies, and charities to ensure quick response and relief. It is required to provide daily updates and situation reports to the provincial Chief Minister, Governor, NDMA, and the Armed Forces (NDMA, 2010). Thus, similar to the role of the NDMA at the federal level, the PDMA is also playing multiple roles and is involved in a number of response functions such as damage and situation analysis, mobilization of food and non-food items, and distribution of funds.

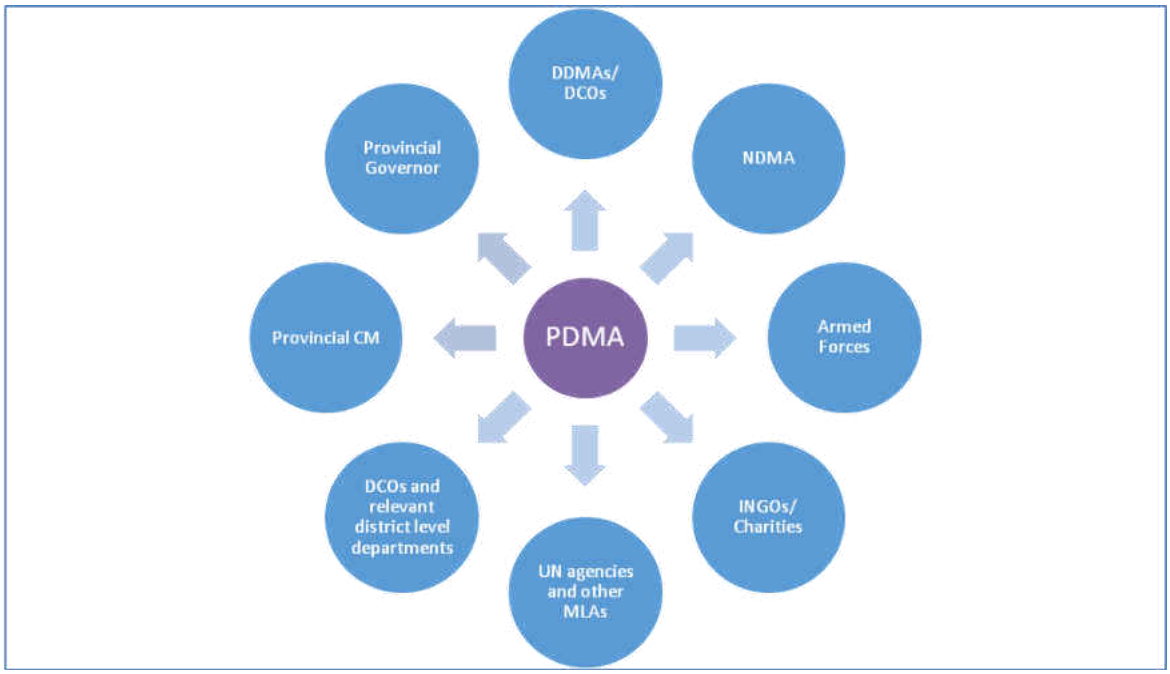

Figure 4 PDMA and Key Partners in the Planned Response System

3.2.3 District Disaster Management

At the district levels, most districts still lack the establishment of DDMAs and so District Coordination Officers (DCOs) are tasked to play an important role along with local government division Commissioners. On paper and through established plans the DDMAs are responsible for, first and foremost, activating the District Emergency Operations Center (DEOC). The

DDMA is tasked to inform all district level departments and relevant agencies in the case of a disaster threat. It should also inform the NEOC and PEOC of a disaster situation. One of the key response functions of the DMA is the evacuation of areas that might be disaster prone. After a disaster strikes the DDMA should provide a damage assessment and needs assessment and share it with PDMA and NDMA. It should also coordinate with the PDMA and NDMA to provide appropriate relief resources (NDMA, 2010).

Apart from planning evacuation and carrying out needs assessments, the agency should be involved in mobilizing resources for providing food and NFIs and medical assistance in affected regions. It should also be involved in the deployment of relevant relief and rescue teams. It is at the district level that the DDMA should coordinate and activate relief camps and mobilize volunteers for relief operations. The DDMA needs to also partner with I/NGOs, UN agencies, charity groups, and agencies to provide timely relief and response. Additionally it is required to prepare and share situation reports with PDMA, NDMA, the Armed forces along with preparing recovery plans and submitting them to the PDMA and NDMA (NDRP, 2010). It is interesting to observe that according to the plans a DDMA is essentially run by the district government, and not a separate official trained in emergency and disaster management. Also on a day-to-day basis, it is fairly difficult to maintain DDMA as a fully functional agency.

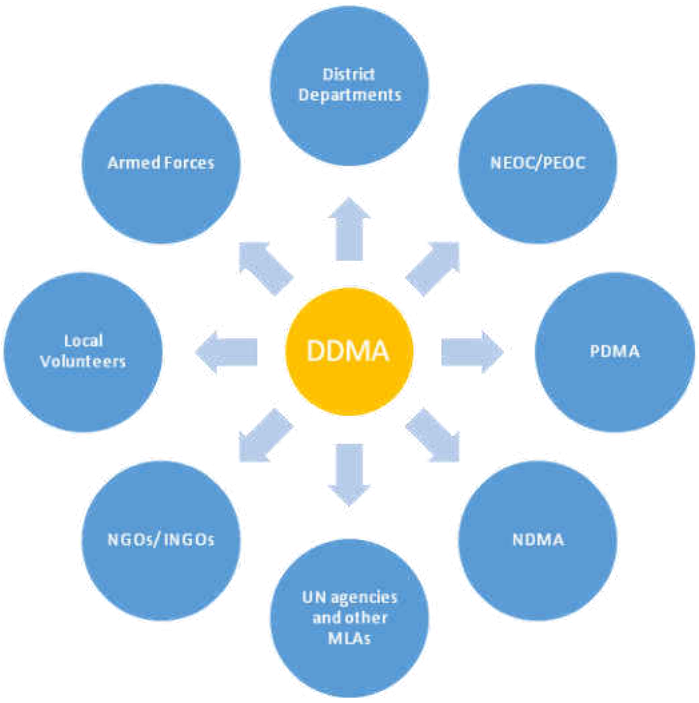

Figure 5 DDMA and Key Partners in the Planned Response System

3.2.4 Disaster Management Plans and Policies

Important legislation and existing structures include the West Pakistan National Calamities Act 1958 that focuses on organizing relief and response operations. An Emergency Relief Cell (ERC), a cabinet division cell was created in 1971 to coordinate and monitor disaster response at the federal level and also provide financial resources to provincial governments during a disaster and also to foreign countries experiencing major disasters (NDMA, 2010).

In 1974 the ERC developed a national disaster plan which outlined responding agencies and the procedures for relief operations. However, this plan was never activated and put into action (Zaidi, 2012). A National Disaster Risk Management Framework was published in 2007. This framework was created to guide the development of disaster management plans and policies

along with strengthening and building the capacity of existing disaster management institutions in the next five years. This framework lists the UN under other key stakeholders and explicitly states that the UN agencies have to work closely with the NDMA and work in accordance with the policies set out by NDMA (Young et al., 2007).

Just before the devastating Floods of 2010, NDMA had created and published another plan called the National Disaster Response Plan (NDRP). However this plan was new and its execution was not possible with the existing apparatus and capacity of disaster management organizations at the national, provincial and district levels (Zaidi, 2012). The 2010 NDRP aimed at solving the issue of coordination difficulties in large-scale disaster response and at involving all major stakeholders to the process of developing policies and plans in their respective areas of jurisdiction (Dorosh et al., 2010). The NDRP document outlines the roles and responsibilities of government bodies and other partnering agencies at every level of operation according to their respective areas of jurisdictions. Standard operating procedures for various relief functions and responding agencies is also described in the document (NDMA, 2010; Zaidi, 2012). The institutional framework set out in NDRP is shown in Figure 1.

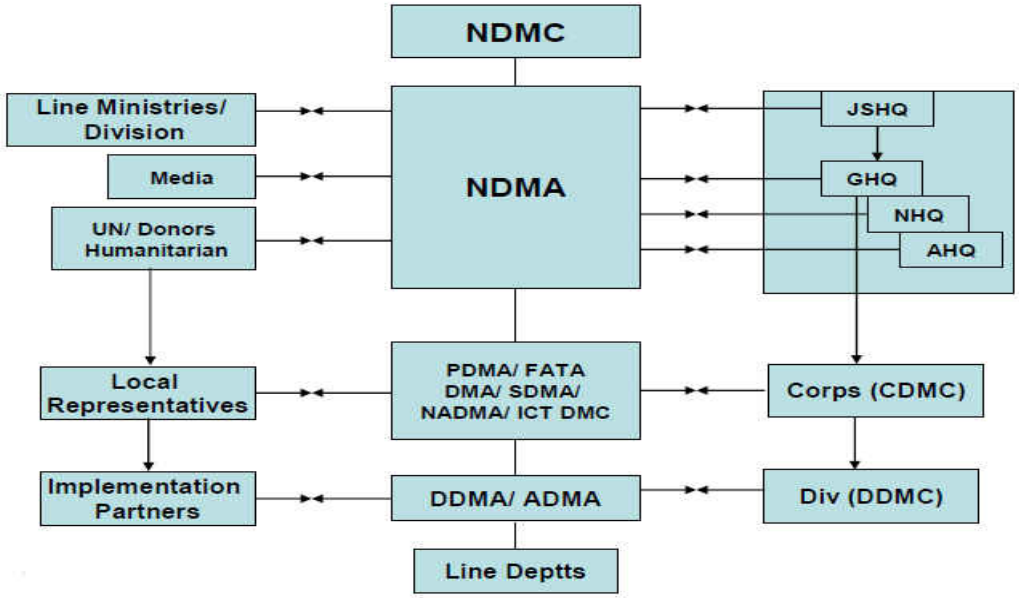

Figure 6 Disaster Management Framework (Source: NDMA, 2010, p. 18)

Acronyms: NDMC - National Disaster Management Commission, NDMA - National Disaster Management Authority, ADMC - Army Disaster Management Cell, CDMC - Corps Disaster Management Cell, DDMC - Division Disaster Management Cell, PDMA - Provincial Disaster Management Authority, SDMA - State Disaster Management Authority, NADMA - Northern Area Disaster Management Authority, ICTDMA - Islamabad Capital Territory Disaster Management Authority, and FATA DMA - Federal Administered Tribal Area Disaster Management Authority

The framework reflects that NDMA is the focal organizations responsible for disaster management. The NDMC is the planning and policy making body while NDMA is the implementation body. NDMA works is close coordination with line ministries and divisions at the federal level along with donor organizations. At the provincial level the PDMAs are responsible for developing regional and state level risk reduction plans and implementing them in accordance with the national level plans and policies. They are also responsible for ensuring that district level plans have been made and are being implemented.

Although the new response plan and the recent experience with disasters has helped to develop national and provincial disaster management authorities and offices there is need to

develop the capacity of these institutions (Dorosh et al., 2010). Therefore in order to enhance implementation of legislation and plans on disaster management and to increase the capacity of responding agencies and offices at the district, provincial and federal level financial resources must be provided (Zaidi, 2012).

The response capabilities to handle catastrophic disasters such as the 2005 Kashmir Earthquake and the 2010 Floods are weak in Pakistan. The country relies heavily on the Army and the humanitarian community for support and relief operations (Amir, n.d.).The Pakistan Army plays a major role in providing immediate response through sear and rescue and evacuation operations (Khan & Khan, 2008). It helps by providing relief good to calamity-struck areas and regions that can be reached via helicopters and choppers only. The Flood Commission also plays an integral role in monitoring the threat of floods by evaluating the water levels at dams and barrages and by communicating closely with all provincial governments in case of irregular and unusual discharge of water level. It also maintains contacts during and after the floods (Khan & Khan, 2008). For the last few years the United Nations Office for the Coordination of Humanitarian Affairs (UN OCHA) has proved to be a strong partner and leader in many respects in managing disasters in Pakistan and in advocating the United Nations' Cluster system. UN OCHA helps in carrying out situation and needs assessments, plays a strong broker role in coordinating with different agencies working in national, local and international capacities, and helps to mobilize resources (Young et al., 2007). UN OCHA is a part of the UN Secretariat and is responsible for coordinating humanitarian response in emergencies. The section below describes the cluster approach.

3.2.5 The United Nations Cluster Approach

The United Nations' 'cluster system' is a popular response, relief and immediate-recovery approach that is used in huge disasters through which relief agencies coordinate their efforts in clusters and sectors. The main goal of the cluster system is to provide timely and coordinated response in disasters. Each cluster is guided by a specific humanitarian service and is assigned a lead agency to oversee and coordinate efforts and also individuals that are referred to as cluster coordinators. The 'cluster approach' is a top-down, UN centered initiative that aims to offer timely and effective response and improve coordination between various responding agencies and actors in huge disasters (Thomas & Rendon, 2010). It is right to say that currently there are two approaches that exist in managing disasters in Pakistan. One approach has been applied several times while the other one has yet to be tried and tested. The newly developed NDRP by NDMA is yet to be fully implemented in response to disasters. However, the other approach, lead by the United Nations has been tried and tested within Pakistan.

The cluster system works to organize relief according to functional operations within different sectors with a predefined and predetermined leadership. This approach was developed and implemented with the aim to improve and increase overall efficiency and effectiveness in a number of areas such as: global capacity for responding to existing and future crises; predictable leadership at both the global and local levels; strong partnerships between responding agencies such as UN agencies, international NGOs and local agencies; accountability and transparency in relief operations; and strategic prioritization and coordination in implementing various clusters during emergencies (OCHA, 2007). This approach was first implemented and tested in the South

Asian Earthquake/Kashmir Earthquake in October 2005, then in the 2007 Sindh and Balochistan Floods and then in the 2010 Pakistan Floods.

The cluster system was piloted in the 2005 Pakistan earthquake. During this time the system tremendously helped in improving relief coordination. But it is important to understand that this is still a system in transition (Young et al., 2007). The issue has been that the UN cluster system and the NDMA itself are still in its development phases and are trying to understand new mandates and operational procedures, etc. In the past NDMA-UN relations were strained due to various reasons. Some of these reasons are:

> the lack of a shared agreement as to the objectives and strategy of the whole operation; misunderstanding of each other's mandates, roles and responsibilities; lack of systematic data-gathering and, from NDMA's perspective, sharing of information on international relief efforts and capabilities; a fundamental difference of approach between overtly centralized, on the one hand, and the more participative and consultative approach of the humanitarian community on the other. This has produced unrealized expectations and disappointment on both sides. (Young et al., 2007, p. 18)

3.2.6 Recent Developments

More recently, the NDMA is carrying out contingency planning for the monsoon season in Pakistan every year. In 2012 and subsequently in 2013, a national contingency plan was prepared by NDMA after various consultation meetings held in different regions and provinces with relevant federal agencies and ministries, provincial departments and district level offices. A two day conference was also planned by the NDMA in June, 2013 to coordinate contingency

plans for the monsoon season in 2013 (NDMA, 2013). Currently, the Punjab Disaster Management Authority has identified 11 districts out of 25 total districts to be vulnerable to monsoon related floods in Punjab. The contingency plan by Punjab has detailed the roles and responsibilities of various government departments and relevant stakeholders along with identifying evacuation sites and relief shelters (NDMA, 2013). The recent National Monson Contingency Plan of 2013 suggests that DDMAs in vulnerable districts have availed capacity building programs and have managed to improve their existing infrastructures and systems.

The most recent policy approved by the National Disaster Management Commission has been the National Disaster Risk Reduction (DRR) Policy in 2013. This policy aims to strengthen the institutional framework of NDMA as it will be the lead agency for implementing this policy. This policy has also been an important step in meeting the goals of the UN Hyogo Framework for Action (HFA) 2005-2015.

Although a comprehensive apparatus has been outlined in the recent NRP, and other recent plans and policies, the challenge is to build the capacity for their implementation at the district and local levels. Currently existing disaster and relief departments across the country, and at different jurisdictional levels lack the capacity or the training for disaster management (Khan & Khan, 2008). The federal government and the NDMA should work towards building community-level capacity by offering trainings and disaster management related certification to personnel working in disaster management cells and offices. The requirement of contingency planning at district levels and the development of plans and SOPs at the local level are steps in the right direction.

However leading national agencies still lack the required capacity to invest in developing better risk reduction methods, and mitigation strategies along with the development of interoperable systems for response and relief. Khan and Khan (2008) suggest that the disaster management agencies suffer from "a dearth of knowledge and information about hazard identification, risk assessment and management" (p. 11). They are certainly also suffering from a lack of financial resources. Therefore, although the disaster management system and existing structure reflect that many organizations are involved in flood management, improvements in interaction and coordination between different entities is required. Also there is a need to delineate clear roles and responsibilities of agencies to ensure there is no duplication or overlap in them (ADB, 2010). Although experience with frequent floods has improved the flood control and management system in Pakistan enormously, there is a lot that still needs to be done. The Pakistan Floods of 2010 were an eye-opener for Pakistan.

3.3 The Role of the Armed Forces in Disaster Response

Pakistan's Armed forces have three main branches: Pakistan Army, Pakistan Navy (Marines), and Pakistan Air Force, along with the Pakistan Coast Guard. The Joint Chiefs of Staff Committee overseas the Armed Forces operations.

Pakistan is a country that has had a tremendous influence of the armed forces in civil administration functions. Despite some periods of democracy in Pakistan, the Pakistan Army has "governed the country directly or indirectly for most of the state's existence" (Fair 2011, p. 572). The country has experienced three military coups in the country from 1958-1971, from 1979 till 1988 and from 1999 till 2008. According to Chengappa (1999) there has been a clear

militarization of civil society in the country. Military officers have taken positions as provincial governors, head of public agencies and some retired military officers have also become political leaders and have stood in elections. With these trends there is a concern of "the creation of an armed bureaucracy" (Chengappa, 1999, p. 299). The Pakistan military have justified their role and interference in the civil administration due to the incompetence of civilian rulers.

The military plays a key role in coordinating and mobilizing disaster relief and response. According to Madiwale and Virk (2011) some of the reasons why the role of the military in disaster response has increased over the years are: "an increase in the scale and incidence of natural disasters; a concurrent trend towards militarization of humanitarian response in conflict situations; and increased interest in disaster response on the part of militaries" (p. 1086).

The international community also partners closely with the Pakistani Military during response since it has the capacity to carry out search and rescue functions, the logistics available for massive relief efforts, and personnel with expertise. However, the international community also recognized the shortcomings of a highly militarized response such as lack of a non-discriminatory and unbiased response (Madiwale & Virk, 2011). Despite the criticisms it is important to understand that the Armed Forces of Pakistan have always played a crucial role in disasters. According to Retired Brig. General Nadeem Ahmed, the former Chairman of NDMA, the Pakistan Army has the capacity to deploy large numbers of all types of responders. The Armed Forces have engineers who look after damaged infrastructure and roads, doctors who provide first aid and immediate medical relief, Army Corps that provide search and rescue missions. Thus, the Armed Forces partner very closely with the different branches of government

during response (N. Ahmed, Personal Communication, September 23, 2013). The following section provides a comprehensive list of response functions that are given importance in national response plans and are activated during disaster response.

3.4 Disaster Response Functions and Clusters

The National Disaster Management Authority (NDMA) in Pakistan has developed a number of response plans and frameworks that have identified certain important response functions. NDMA's National Disaster Response Plan of 2010 refers to the response functions as: Salient Features of Disaster Response (NDMA, 2010, p. 48). These features are: (1) Evacuation (2) Assessment (3) Search and Rescue (4) Medical Services (5) Relief Management (including food and non-food items) (6) Shelter (7) Water and Sanitation (8) Protection (9) Communication (10) Transportation and Delivery (11) Early Recovery and Rehabilitation (12) Compensation Policy (13) Reconstruction Policy. Out of the 13 response functions identified by the government of Pakistan, the last three do not concern immediate response and in fact can be referred to as early recovery and long-term response functions and will be excluded from this discussion of response functions.

Evacuation: Evacuation is one of the most critical response functions when a warning is issued and a threat or hazard is identified specific to a region and area. The main goal of this function is to relocate people/citizens from a vulnerable and high-risk area or even a disaster inflicted area to an area that is safe. This function may take place both before a disaster strikes (voluntary evacuation) and during a disaster (forced evacuation) (NDMA, 2010).

The NDMA's response plan suggests that this function is the responsibility of the district administration officers that are required to develop a team of government officials from various district level officers and departments that include military personnel and some volunteers. The actual evacuation needs to be carried out after the orders of the relevant DCO or Senior Police Officer, and should be carried out with the help of local community leaders, NGOs and community based organizations. Moreover, a list of all the evacuations need to be prepared by the DCO or another designated official and should be reported to the DEOC. In dangerous situations, the government is allowed to use police, Army Rangers and officials to ensure mandatory and forced evacuations. In less threatening situations, district government with the help of volunteers, local NGOs, and local district departments will try and convince people to make voluntary evacuations (NDMA, 2010).

Assessment. Assessments are required throughout the disaster response and relief stage for ensuring that relevant needs of affected regions and populations within those regions are met, relevant relief goods and services are provided in a non-redundant and timely manner. These assessments take the form of situation analysis and also needs and damage assessments. According to the National Response Plan of Pakistan, there are two types of assessments that need to be carried out: The Initial Rapid Assessment and the Expanded Rapid Assessments. The Initial Rapid Assessment, as the name suggests, is an assessment of the basic needs required for immediate response and relief of affected populations and regions. This type of assessment is usually carried out in the first 2-3 days to get a snapshot of the needs and damages caused by the disaster and its results help to arrange for immediate relief and response. An Expanded assessment follows 4-5 weeks after the disaster has struck and collects more detailed data on

needs and damages. According to the NDRP (2010), at the federal level the NDMA is tasked to carry out the rapid assessment by developing a team of 6-8 members from different federal departments. The NDMA is expected to share the report with relevant PDMAs and relevant ministries and other federal agencies. A recommended list of ministries that should be shared the report is also provided by the Government of Pakistan (GoP). This list includes: PDMA, DDMA, Health Department, Public health Engineering Department, Livestock Department (prov/district level); Agriculture Department (provincial and district level), Communication and works/ Social Welfare Department, and Civil Society Representative (NDMA, 2010). The plan also suggests that the GoP may approach international organizations such as the World Bank (WB), Asian Development Bank (ADB) or other relevant agencies to conduct a needs assessment if the need is felt.

Similarly, at the provincial level, the PDMAs are responsible for carrying out a rapid assessment within the first 2-3 days of a disaster. The relevant PDMA needs to develop a team of members from different provincial departments such as the Health Department, Public Health Engineering Department, Livestock Department, Agriculture Department, etc. The findings from the assessment need to be shared with DCOs, DDMAs, CM and Governor of the relevant province, and other relevant departments along with the NDMA (NDMA, 2010).

When the scale of a disaster is small and limited to a district of several Union Councils, then the DCO is required to carry out an initial assessment within 48 to 72 hours after forming a team of members from different district level departments such as the Revenue Department, Health Department, Public Health Engineering Department, Livestock Department, or

Agriculture Department. The assessment report needs to be shared with the PDMA, CM, Governor and other relevant departments at the provincial level (NDMA, 2010).

Search and Rescue. At the onset of a disaster, man-made or natural, one major response function is of carrying out search and rescue operations. Search is the function of locating or finding missing people, while rescue is the act of taking out people from harm's way and taking them to safer locations. The Armed Forces in Pakistan, such as the Pakistan Navy and the Pakistan Army, have the expertise in mountain and air search and rescue operations. The Pakistan Army has played a forefront role in previous disasters to carryout search and rescue functions via helicopters (NDMA, 2010).

Medical Services. Providing medical services as part of immediate response is essential for survivors and affected populations. The Ministry of Health is responsible for mobilizing medical resources and coordinating the overall medical services response. At the onset of a disaster, government health departments along with humanitarian organizations, and Army medical teams provide health services. In previous disasters the Army has played a supportive role of setting up mobile and static medical clinics (NDMA, 2010). Other than the Ministry of Health, other federal level agencies also play an important role in providing and maintaining medical services during the response phase of the disaster. Patient data needs to maintained by NADRA and also be shared with the Ministry of Health and NDMA. Also special needs of orphans, disabled, and women need to be addressed to the Ministry of Social Welfare and Special Education. Also as part of medical services, a disease early warning system needs to be put in place. At the local level, basic health units are trained to identify signs and symptoms of

diseases. The basic health units share this information with district and provincial level health units. Additionally, provincial and district level health departments work closely with relevant humanitarian organizations to carryout health situation analysis and assessments (NDMA, 2010).

Relief Management – Food and Non Food Items (NFIs). The National Disaster Response Plan (2010) refers to Relief Management as the most essential part of the response phase. This is the function that provides 'life sustaining commodities to the affected communities in a fair and organized system' (NDMA, 2010, p. 58). Food aid involves both the distribution and provision of cooked meals for the affected population and the gradual shift to the distribution and availability of dry ration for the affected population (NDMA, 2010). Often duplication of efforts and resources occurs in this response function, thus close coordination with humanitarian organizations and aid agencies dealing with relief supplies is recommended. The national plan also suggests that a ration card be developed for food distribution with the partnership if World Food Programmme (WFP), United Nations High Commissioner for Refugees (UNHCR) and other relevant agencies and I/NGOs.

Non-food aid, or commonly referred to as NFIs includes clothing and bedding, hygiene kits, and kitchen sets. Both in the case of food and NFIs provision there are many humanitarian agencies and I/NGOs working to provide this response function. The national plan recommends that the organizations involved in providing this function need to coordinate and share their agendas and actions with relevant government agencies such as the DDMAs, PDMAs and NDMA to ensure redundancies and resource provision and duplication of efforts is circumvented. Although many humanitarian and multi-lateral development agencies such as the

UNOCHA are leading the function of relief management, the government agencies are eventually held responsible to coordinate and collaborate with I/NGOs and humanitarian agencies concerning this relief function (NDMA, 2010).

Shelter. Immediately following a disaster or a threat of disaster, temporary shelters are made available by the government or humanitarian agencies. These shelters are usually in the form of tents or temporary accommodations in government buildings such as schools, warehouses, playgrounds, etc. The Public Health Engineering Department helps to arrange for temporary water arrangements in shelters.

The response functions can also be understood through the cluster approach that is led by the UN. The cluster system operates in close partnership with the government of Pakistan. Each cluster in lead by a UN agency but is co-chaired by relevant line ministries and NDMA. For instance the Food Security cluster is led by the WFP and is also co-chaired by the NDMA and respective PDMAs. Similarly, the Health cluster is led by World Health Organization (WHO) and is co-chaired by the Ministry of Health.

Table 3.1 shows the UN lead agencies for the activated clusters and the relevant partner line ministries that co-chaired each cluster. In the response plan developed by the UN, the emphasis was laid that "each cluster's response strategy has been developed to recognize that the Government of Pakistan (through its National Disaster management Authority) will lead the relief and recovery activities in flood-affected areas, and that the humanitarian community will focus on covering gaps where the needs exceed the government's response capacity" (UN, 2010, p. 11).

Table 2 Cluster Leads and Co-chairs (Source: OCHA, 2010).

Cluster	**Cluster Lead**	**Co-chair Governmental Institutions**
Food Security	WFP	NDMA, PDMAs
Health	WHO	Ministry of Health
Shelter & NFIs	IOM	NDMA, PDMAs
WASH	UNICEF	Ministry of Environment, Provincial Public Health Engineering Departments
Logistics, Emergency Telecommunications, and Coordination	WFP/OCHA	NDMA, PDMAs
Nutrition	UNICEF	Ministry of Health
Protection	UNHCR	Ministry of Social Welfare

In the Initial response plan developed by the UN 7 clusters were activated to launch their response. These clusters were: Food Security; Health; Shelter/NFIs; WASH; Logistics, Emergency Telecommunications and Coordination; Nutrition; and Protection. These response clusters are briefly explained below. In a detailed interview with the former NDMA chairman (who was serving during the time of the floods) Lt. General Nadeem Ahmed, he emphasized that these clusters work well to get all the relevant players on board. According to him immediate response requires four key clusters to be activated on time. These are: Food, Shelter/NFIs, Health, and WASH (Water and Sanitation) (N. Ahmed, Personal Communication, September 2013). Brief descriptions of these four clusters is provided below.

Food Security. This cluster is essential for meeting basic food requirements for the affected population so that lives can be saved and impacted people can avoid starvation. A

common impact of a disaster is the shortage of food supplies that drives up the price of staple foods. Thus, this cluster aims to meet the immediate food needs and requirements of affected populations. Typical activities under this cluster are: supplying food baskets, ready-to-use supplementary food, high-energy biscuits. Another goal of the flood security cluster is to protect existing livestock. The WFP is the lead agency for the Food Security Cluster (UN, 2010).

Health. The main goal of the cluster is to provide emergency medical assistance and help to affected populations so that lives are saved. The cluster also aims to restore damaged medical units and services to ensure that essential health services are maintained in critical areas and regions. The cluster is also involved in monitoring the health situation closely so that outbreaks of diseases can be identified and prevented. The WHO is the lead agency for the Health Cluster (UN, 2010).

Shelter/NFIs. The main aim of this cluster is to provide housing and shelter to people who have lost their homes or who have been evacuated. Other than providing shelter the cluster also provides Non-food Items (NFIs) such as household kits and tool kits for repairing houses . The International Organization for Migration (IOM) is leading this cluster (UN, 2010).

Water, Sanitation and Hygiene (WASH). The WASH cluster aims to provide safe drinking water, access to sanitation facilities and hygiene kits to people impacted in the disaster. This cluster is lead by United Nations Children's Fund (UNICEF) (UN, 2010).

These response functions identify the basic nature of interactions and the diverse set of resources and skills required to mobilize an effective response. The following section provides an overview of the scale and severity and damages incurred during the Pakistan Floods 2010

3.5 Pakistan Floods 2010

Pakistan has experienced many natural disasters in recent years such as floods, landslides, earthquakes, droughts and cyclones. However, what it experienced in the summer of 2010 was of unimaginable and unprecedented scale since its creation in 1947. The 2010 floods affected over 78 districts (compared to a total of 141 districts) (NDMA, 2011; United Nations [UN], 2011) that cover 100, 000 square km of the country (ADB, 2010) and impacted 20 million people (out of a total population of nearly170 million people) of which 14 million required immediate assistance (Kronstadt, Sheikh &Vaughn, 2010; Independent Evaluation Group [IEG], 2010), 8 million required urgent health care (UN, 2011), and 3.5 million were children (NDMA, 2011). Due to breeched levees, water flowed to rural floodplains destroying agricultural land and resulting in mass destruction of houses and causing a high internal displacement of people. Alongside many roads, bridges and transportation routes were destroyed, causing havoc to the overall infrastructure in many regions across the country. The 2010 Pakistan Floods were referred to as the worst disaster in the history of the country (ADB, 2010). The United Nations (UN) Secretary-General, Ban Ki-moon upon visiting the country declared that this disaster was larger than the accumulated impact of major disasters such as the 2004 Asian Tsunami, the 2005 Kashmir Earthquake, the 2008 Nargis Cyclone and the 2010 Haiti Earthquake (Solberg, 2010). The Secretary-General of UN also referred to as the floods as a slow-motion tsunami (UN, 2011).

Pakistan experienced the worst floods since its creation in 1947. Monsoon rains began end of July in 2010 till August, 2010 and resulted in flash flooding in the northwestern and

eastern regions of Pakistan. Due to breeched levees, water flowed to rural floodplains resulting in mass destruction of houses and internal displacement of people (Kronstadt, Sheikh, &Vaughn, 2010). Flooding began in the northern regions of Pakistan and within days it reached the Arabian Sea, which lies at the southern part of Pakistan. Within a matter of days the entire Indus Valley and surrounding regions were flooded (Webster et al., 2011). The 2010 monsoon rains stood out as a period of above average rainfall in northern parts of Pakistan (Houze et al., 2011) compared to the 1998 to 2010 period. A year earlier in 2009 the monsoon rains were sparser and let to deforestation which helped to exacerbate the flash floods and their run off in the mountainous regions of north (Webster et al., 2011). One major concern after the 2010 floods was to gauge whether these floods were predictable (Webster et al., 2011), and if so why wasn't the government prepared to curtail the flooding or deal with its after effects in a better way. A study by Webster et al. (2011) shows that heavy rainfall could have been predicted a week in advance of the floods. And if they were predicted in time, the government and water management authorities and irrigation departments could have taken proactive measures to release water before flash flooding.

The 2010 floods were ranked as the worst natural disasters in Pakistan in terms of total population impacted and economic loss suffered (NDMA, 2011). It was a profound humanitarian disaster (Houze et al., 2011) since coping with the destruction was not possible for any national government alone. According to NDMA (2011) when the number of affected population, total area impacted and households damaged are all taken into consideration it can be claimed that this disaster was bigger than the combined impact of five major disasters in the last ten years which are: the 2004 Indian Ocean Tsunami, Hurricane Katrina in 2005, the 2005 Earthquake in

Pakistan, the 2008 Nargis Cyclone in Myanmar and the Haiti Earthquake in 2010. Usually the international community views a disaster as huge due to the deaths and injuries it causes. This disaster is often compared with the Haiti Earthquake and rightly so because both disasters took place in the same year but had fairly different dynamics. The death toll was fairly high in the Haiti Earthquake compared to the death toll of around 2000 in the floods, but the area impacted and total population impacted was far more. The impacted area was around 20 times more than Haiti and the total displacements were 13 times more than the displacements in the Haiti Earthquake (Malik, 2011; Webster et al., 2011).

The floods impacted different parts of the country in a dissimilar fashion. The flashfloods in Khyber Pakhtoon Khwa (KPK) and Baluchistan were very intense due to the mountainous terrain of the regions. However, the Punjab and northern Sindh areas are flatter and the riverine flooding had a slow pace but affected massive areas of cultivation and densely populated regions as well (World Food Programme [WFP], 2010). The biggest challenge was to attend to the massive displacements and to provide the displaced survival goods and services such as safe drinking water, sanitation, basic food, medical and health facilities and temporary shelter (UN, 2011).

According to a study conducted by Kirsch et al. (2012) out of the families affected by the floods, 90% belonged to rural areas. This implies that 90% of the families required substantial help to support their survival and provide them relief services. Their study clearly suggests a disproportionate impact on the rural households and communities. Disasters of such nature have a cascading effect. Within weeks of the disaster there was huge threat of malnutrition amongst

the survivors. Most of the people impacted by the floods were unskilled laborers or farmers. These people live either below the poverty line, on the poverty line or just barely above it. 60% of these survivors had lost access to their livelihoods and around 3/4th of the affected had limited access to the supply of food (WFP, 2010).

Along with killing 2000 people, and injuring around 3000 people, the floods also killed several thousand livestock (20,000 cattle drowned) (Webster et al., 2011) and many standing crops (around 2 million hectares) as it wiped areas of cultivated land (NDMA, 2011; WFP, 2010). The flash flooding resulted in a huge agricultural crisis which will take years to recover (Webster et al., 2011).The irrigation sector struggled a great deal after the floods as many systems were destroyed and the plantation and sowing of many crops were delayed. The agricultural costs were believed to exceed 500 million US dollars (Webster et al., 2011).

Floodwaters and heavy downpour destroyed many roads and homes, public buildings and officers, electricity grids and stations and around 2.4 million hectares of land that it cultivated every year (UN, 2011). According to the UN report "over 1.6 million homes, over 430 health facilities, and an estimated 10,000 schools were damaged or destroyed" (UN, 2011, p. 19). Standing water in many regions weeks after the floods started have not only resulted in massive areas of uncultivable land but has also resulted in the spread of water-borne and skin diseases amongst the affected population (Malik, 2011).

The response to the floods was initially slow and very challenging due to the havoc caused to the infrastructure in the flooded areas as many roads, bridges and transportation routes

were destroyed and blocked. Alongside security concerns in northern areas of the country also hindered flood response (Kronstadt, Sheikh, & Vaughn, 2010; Webster et al., 2011).

According to reports the major relief effort was lead by the Pakistani government. The United Nations along with International NGOs and NDMA also helped in relief and response stages of the disasters. Due to the international and national efforts, 1.5 million people were rescued by the 20,000 army/military troops deployed by November 2010. It is also believed that despite the slow onset on response and many relief challenges, search and rescue operations and timely distribution of food and medical assistance were overall successful in saving many lives and handling the breakout of deadly water-borne diseases (Oxfam, 2011).

The Pakistan Army led the rescue and evacuation efforts in the KPK province while humanitarian agencies began providing relief goods to displaced people in August. On August 1, 2010, the government realizes the scale and scope of the disaster and announces that the floods have impacted 1 million people only to realize two weeks later that the actual impact affects 15 million people. It took a while to realize the extent of the disaster for both the government and the international community. The international community became more active after the UN launched an initial floods emergency response appeal at $ 459.7 million on August 11, 2010 (UN, 2011). After the UN Secretary General Ban Ki moon's visit to Pakistan on August 15, 2010 (three weeks after the floods began), on the August 18, 2010, a special session of the General Assembly is conducted to urge the international community to support relief efforts in Pakistan (UN, 2011). A timeline of events pertaining to response are shown in APPENDIX A.

During the floods, the NDMA, being a constitutionally mandated agency, was expected to coordinate the overall response efforts between federal, provincial and district governments along with both local and international NGOs (Malik, 2011). However, due to its lack of experience in coordinating such a huge disaster and leading the response efforts on its own, NDMA partnered closely with the United Nations resident coordinator to come up with a response framework. Moreover, all international organizations had to seek the permission of the government of Pakistan before providing any relief operations.

Moreover, despite a newly developed National Response Plan in March 2010 that outlines the role of federal, provincial and district level disaster management offices (NRP, 2010), the different levels of government were unclear about their roles their local level representatives could play to manage the floods. Moreover, there was also rarely any preparedness efforts, evacuation plans and manuals at the district levels (Malik, 2011).

On the July 30, 2010, the government of Pakistan formally asked the Pakistan Army to carry out search and rescue operations while collaborating closely with the NDMA. Overall, the Pakistan Military helped to evacuate and rescue around 1.4 million people while deploying 20,000 troops who used either helicopters or boats. The Military also distributed essential survival items such as water and food to the affected population. The Military also set up camps for the displaced population and worked closely with the NDMA and PDMAs (UN, 2011).

The UN played the most important support role in the floods via its cluster approach. Recent catastrophic disasters in Pakistan have increased the familiarity and the applicability of the country with the cluster system. The UN also played a very important role to pledge donor

support, create awareness about the scale and scope of the disaster, and urge the international and humanitarian community to respond to the disaster (UN, 2011).

The scope and scale was such that no government could have managed it on its own. The government of Pakistan urged the international humanitarian community to help and support relief and response efforts (UN, 2011). Scaling-up the response by the international community and INGOs also met enormous challenges since many of their resources, financial and non-financial, were being utilized in the Haiti Earthquake that took place few months earlier than the floods. However some UN agencies with a strong presence in the country had already developed a network of partners and garnered resources to scale-up in a short time (UN, 2011).

Overall, one can conclude that the role of the international community in managing disasters in Pakistan is very important. Without the humanitarian organizations such as the UN organizations and other INGOs it is not possible to deal with such massive internal displacements and provide relief services such as food, shelter, health and medical facilities, and temporary housing (UN, 2011).

The perceptions of key individuals involved in response to the floods also provides and highlights important insights. Mr. Nadeem Ahmad, the former chairman of the NDMA in a report issued one year after the floods says: "When I look at the response now, I can see immense achievements. Whether perfectly structured or not, this is because the people, the Government, the UN, donors, and the humanitarian community gelled together. Make no mistakes; this response was a collaborative effort" (UN, 2011, p. 9). While there are interesting insights by scholars describing the floods as "an ideal case study for understanding how

traditionally poor public policies coupled with resource shortages and a weak government can exacerbate the impact of natural disasters" (Malik, 2011, p. 1).

This chapter provided a comprehensive overview of the disaster management system and policies in place in Pakistan. This chapter has also identified the Armed Forces, and the United Nations agencies as crucial partners of the government in responding to natural disasters. The next chapter details the methods adopted to answer the research questions and test the hypotheses. The chapter will also justify the methods used for an exploratory study and explain the reason for adopting a case study design for this type of research.

CHAPTER FOUR: METHOD

The Pakistan Floods of 2010 are an important case to study in depth to reflect on the various factors that influence multi-level collaborative response. It forms a rich case study where the federal government, the military, the international community, and the UN agencies play an integral role. This research follows a mixed-methods approach that is explained in the following sections. The first section of the chapter explains the rationale for utilizing the case study method to conduct this research. The section also discusses the various methods used for analysis such as content analysis, document analysis, and SNA. The second section of the chapter details the unit of analysis, data collection methods, and measurements used for study variables.

4.1 Case Study

Disaster related research has often adopted a case study approach to highlight certain aspects of disasters and study them in detail. The highly contextual nature of disasters warrants a case study approach. Many scholars support the case study method even to formulate and build theory. According to Eisenhardt (1989), theory building from case studies can take place when one or more case develops theoretical constructs and propositions from empirical evidence found through cases. However, the challenge in this approach is that, especially a single-case study approach (which is adopted in this research), rich qualitative data and supporting evidence needs to be intertwined with theory to show that there is a close relationship between empirical evidence and emergent theory (Eisenhardt & Graebner, 2007). Moreover, case study research can be strengthened by ensuring the "careful justification of …theoretical sampling of cases,

interviews that limit informant bias, rich presentation of evidence in tables and appendixes, and clear statement of theoretical arguments" (Eisenhardt & Graebner, 2007, p. 30). Another common approach to justifying a case study method is to combine both qualitative and quantitative techniques and follow a mixed method or triangulation approach. This approach helps to decrease the deficiency in utilizing single methods of research and should be used with great articulation to ensure that it helps to improve the interpretation of results and enhance the study (Thurmond, 2001). Yin (1989) is also a proponent of combining both quantitative and qualitative data to strengthen the case study method. This is a useful technique that can create new ways of approaching and studying a problem compared to single, traditional methods of research (Jick, 1979). Thus, within the overall framework of a case study design this research utilizes the mixed methods approach to collect and interpret the data needed to answer the research questions and strengthen the interpretation of results. These methods include: content analysis, documentary analysis, social network analysis (SNA), and semi-structured interviews of some agency representatives identified through SNA results.

4.1.1 Content Analysis and Document Analysis

Content analysis is a systematic method or technique for measuring the relevant and specified characteristics of a message. According to Atteveldt (2008), the definitions of content analysis by different scholars differ on various aspects but agree on two requirements for this method to be scientific: validity and relevance. Validity lies in following an objective and systematic approach so that selection bias can be avoided. Theoretical relevance is also maintained by identifying certain terms or characteristics that are theoretically relevant.

Many leading scholars in the field have applied content analysis to study an evolving disaster response system (Comfort, 1999; Comfort & Haase, 2006; Kapucu, 2005, 2006, 2012). Through a detailed content analysis of newspapers, situation reports, and after-action reports network analysis is carried out to identify agencies interacting in response to the Pakistan Floods, the types of exchanges taking place, the different levels of agencies involved to see how collaborative response differs at the local, provincial and national-international level, and what functions of response (search and rescue operations, aid/donations, provision of basic relief goods such as food and shelter) are attributed to certain players, sectors, and levels of governance. The detailed content analysis also helps to identify the factors that have hindered and fostered collaboration in response.

Content Analysis of newspapers and after-action reports was chosen as a method for research due to the fact that the Floods of 2010 took place three years ago and there has been recurrent flooding in Pakistan in 2011, 2012, and also 2013. Thus, there was going to be a threat of information bias and challenges with recall if representatives of agencies were interviewed to develop a network of relationships or if a snowball technique was used to identify the network. Relying on after-action reports, situation reports, and newspaper coverage of the Floods helped to reduce the threat of bias in this research.

Document Analysis was also carried out for developing and indentifying a planned response network of agencies that exists according to response plans. Two documents were analyzed to formulate and understand the planned response network. These two documents are: The 2010 Floods Response Plan developed by UN in early August 2010 just after the Floods began and followed the cluster approach, while the other was the National Disaster Response

Plan (NDRP) developed by the NDMA of Pakistan in March 2010 (few months prior to the 2010 Floods). Although the NDRP was not implemented fully, it identified detailed SOPs of responding agencies for each government level. Through the SOPs, roles, and responsibilities identified for major stakeholders and responding agencies at the district level, provincial level, and the federal level, a planned response system was developed. This plan was developed after several consultations with major stakeholders. The effectiveness of the actual response network is compared with the planned network that is recommended in the NDRP. This is a viable method of analyzing the effectiveness of response networks and has been adopted by Kapucu, and Demiroz (2011) to analyze Hurricane Katrina and September 11 Terrorist Attacks response networks.

The table below shows an example of the excel codebook for the content analysis conducted as part of this research. An open coding method was utilized to code relevant content from newspapers, after-action reports, and situation reports. There are several methods identified for open coding by Strauss and Corbin (1998). The method followed in this research follows the analysis of whole sentences and paragraphs to determine whether relevant information is found in the content. This method is most useful when the researcher has already formulated and identified certain categories according to which coding will be carried out. In this research the response functions were already identified through a review of the existing response plans. Moreover, categories for the types of organizations such as government, private sector, nonprofit, and multi-lateral agencies were also identified and so were the level of organizations (national, international, provincial, and district).

Date	Organization	Contact	Type of Organization	Level of Organization	Region of Response	Transaction	Interaction	Response Function/Cluster
72210	Chief Minister Punjab's Secretariat	CM Punjab Shahbaz S	Government	Provincial	Lahore/Punjab	CM Mian Shahbaz Sharif has directed the health authorities to make all-out efforts to ensure prevention of infectious and waterborne diseases in the monsoon	Punjab Health Department	Health
72310	Gujranwala Chamber of Commerce and Industry	President Khalid Mahmood	Private	Local	Gujranwala	Chamber's President Khalid Mahmood has urged Punjab CM Shahbaz Sharif to issue grant for upgrading of sewerage system of Gujranwala city on emergency basis	Chief Minister Punjab's	WASH
72410	District Coordination Office Guranwala	DCO Gujranwala	Public	Local	Gujranwala	DCO has asked all departments concerned to keep ready their flood relief and management plan to meet any emergency	Department of Health Gujranwala	WASH

Figure 7 Example of Content Analysis Coding

4.1.2 Social Network Analysis

After carrying out a content analysis some descriptive statistics were generated to show how the response network was different at each level of response (at the national-international level, at the provincial level, and at the district levels), what was the organizational composition of the network, and how the network evolved over the span of four weeks (the initial response period). The period of four weeks (starting from July 22, 2010, till August 19, 2010) specifies the boundaries for data collection. Boundary specification is an important issue in analyzing and collecting data on networks. There are different methods in specifying network boundaries. The event-based strategy is applied in this research. As the name suggests an event-based strategy is applied when an event or certain activity takes place and the actors that participate in that event or activity make up the boundary of the network. However, this approach requires a careful examination of setting the most appropriate location, and identifying the correct activities for the purpose of the research so that this method gives a complete picture of the network and includes all significant actors and activities (Knoke & Yang, 2008). This research adopts the 4 week period of initial response. Scholars in the field have utilized 3 weeks for studying response in

disaster research such as Comfort et al. (2011), Comfort (2002), and Kapucu (2006). This research chooses a 4 week period instead, since the rains started end of July, but the realization that this was a full-fledged disaster came later around the beginning of August. Also it is important to understand that floods are a slow onset disaster compared to other natural disasters such as earthquakes, tsunamis, or hurricanes.

The information on the agencies, types of agencies, nature of interactions between agencies was entered into excel sheets so that network analysis was carried out. UCINET (Borgatti, Everett, & Freeman 2002), a popular software for carrying out SNA, is used to present data in the form of sociograms and network structural aspects and measures are analyzed and compared between different networks that have developed. The structural aspects of the networks, the characteristics of responding agencies, the most central players, and boundary spanners in response were identified. Apart from conducting a network analysis for the actual response networks, the UCINET software was also used to develop sociograms for the planned response networks derived from the NDRP of 2010. The comparison between the two helped to gauge the effectiveness of response.

As mentioned earlier in the literature, SNA contains measures that study individual nodes/organizations and their interactions and connections with other nodes such as centrality measures, and also contain measures that study whole networks such as density of the network. This research uses the following centrality and whole-network measures.

Degree Centrality: This ego measure identifies the number of ties each actor has with other actors. The more ties an actor has with others in the network the more easy access the actor

has to different resources and the less dependency on one or few particular actors. Due to this positional advantage they also have brokerage power. Ties can be either directional or un-directional. In this study we have observed interactions and links at un-directed. This study uses Freeman's degree centrality procedure. This procedure also shows value of normalized degree centrality. Standardized and normalized values of centrality will help to compare the value across various networks with different structures and sizes (Hanneman & Riddle, 2005).

Closeness Centrality: Rather than only taking direct ties and links to other actors in account, the closeness measure also takes indirect ties to others in account. This measure helps to identify whether the actors are central in the whole network or in a sub-network only. In this research the eigenvector of geodesic distances closeness measure is utilized. This is an important measure that identifies most central players in the overall network and rather than local area and utilizes factor analysis to arrive at these results. Also this procedure assumes symmetric data which is relevant for the data collection techniques employed in this study (Hanneman & Riddle, 2005).

Betweenness Centrality: This is a measure used for binary data. The interactions in this research are also termed as binary. When a relationship exists between two nodes the value is "1", when an interaction does not exist between two organizations the value is "0". An actor within a network that has a high betweenness score is in an advantageous position since it lies between the geodesic paths of other pairs of actors (Hanneman & Riddle, 2005). In this research the Freeman's approach to binary relations is used.

Density: This measure is a macro level measure that calculates the proportion of ties that are present compared to all ties that are possible in the network. Density is important to gauge the levels of connectivity and social capital available in the network (Hanneman & Riddle, 2005).

Centralization: For centralization, this research utilizes Freeman's graph centralization measure that reflects the variance and positional inequality of a network. A high centralization figure, let's say of more than 50% shows that the power of different players within the network in largely unequal as some actors are positioned in more advantaged and powerful positions compared to other members. For a low centralization figure – let us say around 15% it can be assumed that positional advantages in the network are more or less equally distributed in the network (Hanneman & Riddle, 2005).

Clique Analysis: This is the method that helps to identify the sub-networks and tightly tied nodes that emerge at the micro level so that the structure of the network at the macro level can be understood in a better way. Thus, a clique depicts the maximum number of actors that have the highest possible density amongst themselves (all possible ties between them exist). It is important to view clique overlap to see which are the most central players and those players playing multiple roles in the network (Hanneman & Riddle, 2005).

4.1.3 Semi-structured Interviews

The SNA results helped to identify the key players within the actual response networks and the planned response networks at each of the three levels of response. A list was developed to seek the appropriate contacts and attempts were made to obtain an institutional response from

the identified agencies. At the national-international level, the key players identified through centrality measures were: National Disaster Management Authority (NDMA), International Organization of Migration (IOM) (the leading agency for the Shelter cluster), Pakistan Red Crescent Society (PRCS), Government of Pakistan (GoP), and World Food Programme (WFP) (the leading agency for the Food cluster).The main players identified at the provincial level were: Chief Minister Punjab, Punjab Health Department (PHD), PRCS, WHO, Pakistan Army, and PDMA. The PDMA was identified as the focal player in the planned network, but had very low centrality scores in the entire network. This was a cause of concern and the need was felt to get an institutional response from PDMA and understand its role in the provincial response system. At the district level, the key agencies that were identified in both the Dera Ghazi Khan district as central players included: Chief Minister of Punjab, PHD, and the district administration or District Coordination Officer (DCO) of both districts.

To conduct interviews of the identified agencies and to collect additional relevant data for content analysis and document analysis, a field visit was conducted from May 28, 2013, till July 8, 2013, in Pakistan. This was an election year for Pakistan and the highly anticipated elections were conducted mid-May, two weeks before the scheduled visit. Due to the transition between the interim government to the newly elected government, it was difficult to approach officials who had been involved in the 2010 Floods. Therefore, during the field visit most of the time was spent in identifying and locating the correct contacts for interviews. The relevant contacts were either identified through conversations with high officials in the government who knew the system well or were identified through websites of government offices and government reports or situation reports. After identifying the relevant contacts, these people were either sent emails

or contacted via telephone. In the case of telephonic conversations, the permission to conduct an interview along with the explanation of exempt research and questions for interview was also sent via email. APPENDIX F provides a list of the interview questions.

All the agencies identified at the national-international level were contacted except the Government of Pakistan. NDMA represented and led the overall government response, thus the need to separately contact the former PM and President of the country for an interview was not recommended nor possible given the recent elections and change in government. IOM and PRCS were contacted via email multiple times. The initial contacts for IOM responded but referred to additional contacts who were more involved in the Floods of 2010. A major issue encountered in getting the relevant contacts for international organizations was that most of the field workers involved during the Floods of 2010 were not serving in Pakistan anymore but were serving in other countries going through crises. The relevant contacts that were finally indentified by IOM representatives did not respond. The contacts identified through after-action reports of PRCS did not respond as well. Both the current and former Chairmen of NDMA were contacted via email.

The NDMA Chairman, Mr. Nadeem Ahmed, a retired senior Army officer who served during the 2010 Floods and also led the relief and recovery efforts in the 2005 Kashmir Earthquake, was the most relevant contact for the nature of this research. He responded very quickly and forwarded his telephone number and a telephonic interview time was set with him. His comprehensive responses provided detailed information on the background of the 2010 Floods, all the collaborative efforts with key partners including international donors and

countries and humanitarian agencies. He also provided written responses to the interview questions via email in addition to the detailed telephonic conversation.

The current chairman of NDMA Major General Saeed Aleem was also contacted via email. He initially agreed to respond, but then due to the Earthquake in Balochistan Province on September 23, 2013, and its aftershocks he was occupied with relief efforts in Balochistan and was unavailable to be interviewed. An official from WFP, who was deployed in the 2010 Floods in Southern Punjab, and is now at a senior position in the WFP country office in Islamabad, agreed to be interviewed. He provided detailed responses to the questions via email. Thus, at the national-international level senior and relevant officials from both NDMA and WFP were successfully interviewed.

At the provincial level the Chief Minister (CM) of Punjab was identified as the most central and important contact. However due to recent elections and also due to the busy schedule of the CM Punjab it was difficult to interview him. Through discussions with some bureaucrats and senior officials in Punjab during my field visit it was suggested that the former Chief Secretary of Punjab, Mr. Nasir Khosa, should serve as the closest proxy to the CM and should be interviewed to represent the CM's response. Mr. Nasir Khosa at the time of the interview was serving as the Secretary to the Prime Minister of Pakistan and is now appointed as one of the Executive Directors at the World Bank in Washington. He has worked closely with the CM of Punjab during the floods of 2010, 2011, and 2012. He was interviewed briefly using Skype technology and was interviewed in detail via telephone. The founding Director of PDMA, Khalid Sherdil, who was also serving as the Director General relief of the Board of Revenue in Punjab,

was also interviewed via telephone. Several short conversations were held with him due to his busy schedule since he is now serving as the principal secretary to the CM of Punjab. He provided important information regarding the overall relief efforts in Punjab and also provided several documents related to the 2010 Floods response. He also highlighted several websites that provide relevant information on Punjab government's immediate response to the 2010 Floods. Since the Pakistan Army was identified as an important player at the provincial and local level, a senior official of the Public Relations department of the Army which deals with media was contacted and interviewed. He sent brief responses and requested that his responses should represent the response of the Army. A WHO official deployed during the 2010 Pakistan Floods also responded to the interview questions briefly and suggested that after-action reports and situation reports of WHO's response should be studied in detail to get an idea of the institutional response to the floods. The Secretary of the PHD was contacted via email but no response was received.

At the district level the CM and PHD were identified as key players in response networks along with respective district administrations lead by DCOs. Relevant DCOs were contacted through email multiple times but response was not received. Some other bilateral agencies such as UNICEF, UN OCHA, and UNODC were also contacted. But instead of agreeing to be interviewed these organizations sent after-action reports relating to the 2010 Floods.

A total of 6 interviews were conducted. All respondents were male and held senior positions in their respective organizations. Three of these interviews were conducted primarily via telephone, and remaining three were conducted via email (responses to the questions were

emailed). Each telephonic interview was transcribed and detailed notes were taken to ensure important information was not missed.

Interviews are relevant when the disaster is fresh in the minds of agency representatives responding to the disaster and recall is not challenging for them. This research does not rely on interviews heavily since there are a number of issues with this type of analysis. Some of the issues are: With elections held earlier this year, there is a change in the government and most government agency heads have been posted to other provincial departments. Thus it is difficult to get in touch with officials operating in the Floods of 2010. Also recording the response to Floods which requires recall might not be accurate since floods have occurred every year in the summer monsoon months after 2010. Thus, document analysis and content analysis was the most appropriate method to be utilized to study the 2010 Floods in Pakistan. Some interviews were conducted to achieve triangulation in the research and get supportive information about the institutional responses from organizations, agencies, and departments that played an important role in floods of 2010.

4.2 Unit of Analysis, Units of Observation, and Study Variables

The unit of analysis for this study is the collaborative response network which emerged in the 2010 Pakistan Floods at different levels. This is derived through two different units of observation which are: individual responding agencies/organizations and the inter-organizational interactions and relationships between these organizations functioning in the overall disaster response networks. Through content analysis information on both units of observation were collected.

Table 3 Variables of the Study and their Operationalization

Study Variables	**Role of variable**	**Measurement of the variable**
Collaborative Response Effectiveness	Dependent	Network Analysis - Through the comparison between the planned and actual response network. Similarity depicts an effective collaborative response. Clique analysis results depict cohesive and collaborative response as well. Are cliques formed around specific response functions? Semi-structured Interview Question: Was your organization collaborating and cooperating with multiple organizations during response?
Network Capacity	Independent	Network Analysis - Centrality especially closeness eigenvector centrality depicts the power to mobilize others. Which organizations have strong closeness eigenvector centralities? Which have weak? Which agencies enjoy clique overlap in the cliques identified? Semi-structured Interview Questions: Does your organization, on a regular basis, engage in relationship-building activities with other agencies such as training drills and exchange of ideas? Do you engage in and avail opportunities to form newer partnerships with other and newly formed agencies working in the community?
Leadership/ political Support	Independent	Network Analysis – Centrality measures - Who are leading the response? Are those the ones identified in the actual response plans? Are clear leaders identified in the actual response systems? Are they providing support to others in the network and facilitating and brokering exchanges? (Betweenness centrality)
Institutional Support	Independent	Network Analysis – Betweeness Centrality - Who are the brokers? Are they the ones identified in the Response Plans? Are the central players managing and administering relief funds? What players are providing coordination and logistical support? Content analysis provides rich support on what institutional arrangements were activated during response. Semi-structured Interview Questions: Are there formal and informal institutional rules for supporting collaboration in place? Are plans and policies in place? Are they effective?
Organizational Resource Dependency	Independent	Network Analysis – centralization/decentralization, density of ties, the kinds of resources exchanged identified through content analysis. Does Clique Analysis depict mutual exchange between agencies that are highly resource dependent on each other?

The operationalization of the study variables is shown in Table 3. A number of network measures discussed earlier are utilized to measure the study variables.

4.3 Data Collection

To get accurate information in order to capture the complete collaborative response to the disaster national newspapers (i.e., *The News, The Daily Times*), international newspapers (such as *The New York Times* – US based and *The Guardian* – UK based), and after-action reports and situation reports by the UN OCHA, IOM, UNICEF, USAID, WFP, WHO, IFRC, and PRCS were reviewed. These sources provided information on organizational actors and the interactions between them. The initial response period lasts for three weeks according to the leading scholars in the field thus newspapers and documents published from the onset of the Floods starting on July 22, 2010, till August 19, 2010, were used. Moreover, data from the NDRP of 2010 and the UN Response Plan for the floods were used to collect data and information on the planned response system/network.

4.4 Validity and Reliability

The reliability of data collected through a content analysis hinges on the consistency of the method utilized to collect and identify words and interactions through the content. Moreover, the fact that the content analysis and identifying relationships between players is backed by a sound theoretical framework and follows a consistent method warrants the validity of the results and observed patterns (Riffe et al., 1998). This research follows an established method of data collection that is well accepted in the scholarly community.

There may be some issues with construct validity since not many scholars and academicians have attempted to link network measures to the type of constructs used in this study. Multiple measures are used for each construct since there is no single measure that can cover all aspects of the construct. However, the measures for each construct have been based on the literature. Also it is important to understand that SNA is not a traditional tool of analysis that requires a clear formation of independent and dependent variables and the causal relationships between those variables. So as such there have not been any attempts to test and establish construct validity. However, in future research this study will go beyond the exploratory and descriptive study it is and will advance the constructs of collaborative response effectiveness and the factors influencing collaborative response. The measures of centrality and clique analysis have often been used in the field to understand the collaborative interactions in disaster response networks. Thus, the face validity of using centrality measures to depict leadership and using clique analysis for collaborative activity is well-established and high.

The exploratory and descriptive nature of the research also raises some concerns about internal validity and selection bias. Some semi-structured interviews were carried out. The list of organizations was chosen according to SNA results, particularly centrality results. However, since the analysis deals with understanding the system at all levels – provincial, federal, and local, a number of organizations were chosen to represent and understand each level based on centrality scores. However, although all central players were contacted through either emails or telephone, not all replied and responded. Thus, proxy organizations (not most central) were chosen for conducting some interviews instead. So there might be some element of selection bias in the study although attempts were made to interview the most central players to understand the

level and nature of collaboration. Also attempts were made to contact the CM of Punjab because of his most central role, but due to election campaigns and the new formation of government it was difficult to reach him. Instead the serving Chief Secretary of Punjab during the floods was identified and interviewed to represent the response of the Chief Minister of Punjab during the Floods. These replacement and proxy points of contact were identified through discussions with personal Pakistani contacts that are bureaucrats in the country and understand the system very well.

Since this is a case study, there might be some challenges posed to the external validity of the study. The information provided through the semi-structured interviews does not provide information representative of the whole response systems studied at each level. They provide supportive information to the SNA results and are not generalizable to whole response system being studied. The aim of semi-structured interviews was not to provide a representative view of the whole network but to gather supportive information from the most central players either identified in the actual or planned networks at each level.

In terms of the reliability of the data, many measures were taking to ensure that the data collected was free of selection bias and would be highly reliable. The fact that data was collected from a number of sources such as both national and international newspapers and after-action and situation reports from several humanitarian organizations reflect that the response networks identified were representative of the actual system. For example, if government reports were only relied upon the system would have reflected the government response system and might not have reflected the response of the international humanitarian community fully. Also since

multiple sources were used for data collection, there was the risk of duplicating interactions and exchanges. The duplicate information was carefully examined and was eliminated while preparing a database and entering SNA data into excel sheets. Also triangulation was achieved by including some semi-structured interviews to support SNA analysis. Ethical concerns of getting IRB approval before conducting the study were met and additional compliance concerns and challenges in meeting ethical standards in regions of Pakistan were also met. An IRB approved and exempt explanation of research is provided in APPENDIX E and F.

4.5 Region Selected for Study

Out of the four provinces that were impacted by the floods namely: Khyber PakhtoonKhwa (KPK), Punjab, Balochistan, and Sindh, one province was chosen for provincial level analysis and district level response. The Punjab province was chosen for this study. A valid question to ask is: why is the provincial level of response only going to focus on the Punjab province and the highly impacted districts within this province? The first reason is that it is not possible to study and analyze the response networks in all localities throughout the country due to the scale and scope of the disaster. Also the timeline of events shows that the not all regions and provinces were impacted together or similarly. The floods started in KPK and Balochistan, and then moved along to the southern parts of the country. So the nature of destruction and impact was very quick in the mountainous regions in KPK and Balochistan, while the nature of destruction varied in terms of the pace and scale in flat regions of Punjab and Sindh. According to a flood assessment carried out by the WFP (2010) results show that KPK suffered the highest number of fatalities due to the sudden onset of flashfloods on the July 22, 2010. Although precious lives were lost, the irrigated and cultivated lands did not suffer. KPK province was

more or less well-prepared to deal with the disaster. In KPK there were already many projects going on for community development and community-based disaster risk management (UN, 2011), and there was already a strong military presence in the region which meant quick access to transportation, evacuation and relief goods. Balochistan suffered the least due to its low population density and huge mass of rangeland (almost 80% of the land area is rangeland).

The Punjab province due to massive riverine flooding which is a slower phenomenon than flashfloods but its impact was huge due to the fact that areas surrounding River Indus are highly populated and highly irrigated. The Punjab province also has the second highest amount of damage costs amongst all provinces (Table 4). Moreover, Declan Walsh, a journalist from *The Guardian* describes the response and relief efforts in the Punjab province to be a chaotic and patchy. There were also certain political allegations floating about how floodwaters were diverted from certain regions to other regions (UN, 2011).

Table 4 Estimated Provincial Damage Assessments (adapted source: ADB, 2010)

Province	Damage Costs PKR millions	Damage Costs USD million
Balochistan	52,676	620
Khyber Pakhtunkhwa	99,625	1,172
Punjab	219,272	2,580
Sindh	372,341	4,380

Interestingly, in the wake of the disaster when all provinces had a functional PDMA, Punjab was the only province that had failed to establish a formal body with a formal Director

General leading the efforts. It is only after the Floods had started that the CM of Punjab quickly approached Khalid Sherdil, the founding Director General of PDMA, to head the PDMA in Punjab and coordinate the relief and response functions. This makes studying the response network in Punjab certainly more interesting and important due to the political influences and complexities in the response stage of managing disasters.

This chapter addressed the methods utilized to answer the research question pertaining to this research. The chapter has detailed the process and sources of content analysis and document analysis along with the process followed for conducting interviews. The next chapter reports the results of the SNA at each level of governance and compares actual networks with planned response systems. The results are substantiated and supported with the result of semi-structured interviews and also some excerpts from content analysis of newspapers and after-action and situation reports. The last section of the chapter highlights key findings to address the hypotheses in the study.

CHAPTER FIVE: ANALYSIS AND FINDINGS

This chapter presents the results of the SNA conducted through content analysis of newspaper articles, after-action, and situation reports. SNA was used to identify both the actual networks during response and also the network response system identified through existing disaster management plans. Along with content analysis and document analysis, some semi-structured interviews of key representatives and agencies identified through SNA were also conducted.

This chapter consists of five sections. The first section analyzes the local level disaster response through SNA analysis and additional document analysis. The second section discusses the provincial disaster response pertaining to the Province of Punjab. The third section describes the national-international level of response through SNA results and document analysis. These sections highlight some important additional information collected through semi-structured interviews that contribute to understanding the various factors that were either hindering or facilitating the collaborative response in the 2010 Pakistan Floods. Throughout these sections the actual response networks are compared with the recommended and planned response networks and frameworks that exist in previous and existing disaster management plans. These planned response networks and structures are compared with the actual response networks in the 2010 Floods to examine response effectiveness and identify the key agencies that are still missing in recently developed plans. The fourth part synthesizes the overall results and provides some important discussions and findings. The last part of the chapter addresses the study hypotheses.

5.1 Local/District Level Response to the 2010 Floods

According to the Punjab's Provincial Disaster Management Authority [PDMA] (2013) the worst affected districts in the Province were Bhakkar, Layyah, DG Khan, Mianwali, Rajanpur, Muzaffargarh, and Rahim Yar Khan. Punjab's government, backed by the Provincial Disaster Management Authority (PDMA) led the relief efforts to provide relief in impacted regions. Quick evacuations were carried out in many regions and temporary shelters and later on tent villages were developed for the displaced people of Punjab. Due to the massive scale of the Floods, the NDMA along with respective PDMAs had appealed to the international community and to the UN particularly, to provide support in managing the unprecedented disaster (PDMA, 2013). Through an interview with the former chairman of NDMA, Lt. General Nadeem Ahmed it was found that at the onset of the Floods (early August) Punjab was criticized for not establishing a fully functional PDMA since an Act for the establishment of PDMAs and DDMAs had been passed in 2007 and the Punjab government had failed to take action. It was in the midst of the disaster that the CM of Punjab, Shahbaz Shareef quickly appointed a PDMA chief and made the organization operational (N. Ahmed, personal communication, September 23, 2013).

During the 2010 Floods, Mr. Khalid Sherdil was appointed as the founding Director General of Punjab's PDMA. He was involved in leading the relief and reconstruction efforts during the 2010 Floods. PDMA's Major accomplishments during the relief phase were the development of Model Villages in Punjab for the internally displaced people (PDMA, 2013). These model villages are a huge success story in the country and during a telephonic conversation with Mr. Sherdil, he re-iterated the success of this project and the partnerships and

collaborations it required. Moreover, another major accomplishment led by Mr. Sherdil during the relief and rehab phase was the disbursement of the *Watan* Cards (flood-damage compensation debit cards) that were provided to more than 1 million families in Punjab. These are well planned efforts and deserve to be recognized as part of a successful response and recovery strategy developed by the Punjab government and the PDMA.

However, during the initial phase of response – the first 3-4 weeks following the onset of the disaster – provincial governments and other leading agencies such as the PDMAs did not have enough resources to mobilize massive recovery and reconstruction strategies, but were more focused on providing relief for basic survival needs of the affected population. Relief in the early stages (3-4 weeks) majorly concerns the distribution of basic food and non-food items (NFIs) such as temporary shelter, clothes, blankets, and jerry cans. The former NDMA Chief, Lt. General Nadeem Ahmed suggests that initial response should focus on four main elements: Shelter, Food, Health, and Water and Sanitation (N. Ahmed, personal communication, September 23, 2013). Thus, at the local response level, these functions require immediate mobilization of relevant resources from both communities and international UN cluster agencies that have a huge donor support base.

The content analysis and document analysis of the National Disaster Response Plan of 2010 shows the recommended/planned response framework/system at the local/district level. The following sections of the chapter discuss both the planned and actual response networks in detail; identify the similarities and differences between them, and the important characteristics of both actual and planned response systems.

Out of the 7 highly affected districts in Punjab, immediate response systems and networks were identified in two of the 7 districts in this chapter. Two districts that were chosen in this study are: Dera Ghazi Khan (DG Khan), and Muzaffargarh. These two were chosen due to the high amount of total damages incurred and suffered in these regions. Table 5 and Table 6 below shows the comparison of the damages incurred in these districts and some basic information on the initial relief operations provided by Punjab's PDMA (PDMA, 2013).

Table 5 Initial Damage Assessment in worst hit districts in Punjab (Source: adapted from PDMA, 2013)

District	Estimated Population	Number of Villages Affected	Infrastructure Damages	Damages to the Education Sector	Livestock Damages	Agriculture Damages/ Crops Affected	Total Damages in billions
Bhakkar	1,346,000	64	Rs. 1.69 billion	Rs. 1.63 billion	200,000 animals	99,060 acres	Rs. 6.47
Layyah	1,486,000	70	Rs. 0.53 billion	Rs. 1.38	380,000	143,500	Rs.4.41
DG Khan	2,219,000	**237**	Rs. 2.23 billion	Rs. 3.35 billion	1,500,000	148,146 acres	**Rs. 10.42**
Mianwali	6,936,000	154	Rs. 2.25 billion	Rs. 3.32 billion	120,000	31,945 acres	Rs. 10.82
Rajanpur	1,485,000	168	Rs. 4.03 billion	Rs. 3.30 billion	600,000	355,984 acres	Rs. 11.37
Muzaffargarh	3,579,000	**323**	Rs. 5.61 billion	Rs. 5.65 billion	2,500,000	400, 260 acres	**Rs. 16.66**
Rahim Yar Khan	4,198,000	82	Rs. 2.85 billion	Rs. 3.39 billion	900,000	136,046 acres	Rs. 9.9

Table 6 Relief Information in worst hit areas of Punjab (Source: adapted from PDMA, 2013)

District	People Evacuated	People provided with First Aid	Police Relief Camps	NGOs participating in relief efforts
Bhakkar	1,308	472	7	7
Layyah	2,878	149	35	9
DG Khan	**11,156**	**2,393**	**25**	**9**
Mianwali	0	431	14	8
Rajanpur	8,208	1,311	14	9
Muzaffargarh	**10,841**	**400**	**44**	**19**
Rahim Yar Khan	586	96	64	9

Before discussing the actual response networks that emerged in the highly impacted districts it is important to provide an overview of the existing plans, Standard Operating Procedures (SOPs), and frameworks available for disaster response at the local-level. The next section provides a discussion on the existing response framework at the district level (as recommended by the NDRP of 2010).

5.1.1 District Disaster Response Plans and Frameworks

The National Disaster Management Ordinance of 2007 orders that all districts should establish DDMAs. The NDRP of 2010 suggests that all districts have established these authorities but many of them are not functional. The DDMAs are essentially led by Head officials of *Tehsil* (an administrative division that heads several villages and municipalities) and District Administration such as DCOs (NDMA, 2010). Thus, in the case where a DDMA is not

operational, it is fair to make the assumption that the coordinating and leading body for the response system will either be the *Tehsil* Administration or the District Administration according to the response system structured in the NDRP of 2010. Since the PDMA was not functional at the onset of the 2010 Floods, it is fair to make the assumption that DDMAs also essentially existed in plans and on paper in the provincial districts. The former Chairman of NDMA and the Chief Secretary of Punjab both confirmed that DDMAs existed on paper only.

The 2010 NDRP for Pakistan includes a detailed appendix of the SOPs for district level organizations and agencies. Appendix B provides the SOPs for the response phase of district level agencies as provided in the NDRP of 2010. Appendix H provides a list of abbreviations for the agencies in the planned district response framework. Through a document analysis and a thorough review of the SOPs, SNA was utilized to develop the planned response framework for district level response. The planned response network is shown in the Figure 8.

In Figure 8 the DDMA, DEOC, and the TMA all play central roles within the network. Although according to the National Disaster Response Plan of 2010 most districts have established a DDMA. Mr. Khalid Sherdil, the Director General of PDMA during the floods of 2010, and now the Principle Secretary to the Chief Minister Punjab, also suggests that on paper and through plans district level disaster management authorities have been identified, but they lack the operational capacity to function (K. Sherdil, Personal Communication, July 25, 2013). The Chief Secretary of Punjab during the 2010 floods, Mr. Nasir Mehmood Khosa also suggests that the districts and local governments lack the capacity to develop fully functional disaster management authorities (N. M. Khosa, Personal Communication, July 6, 2013).

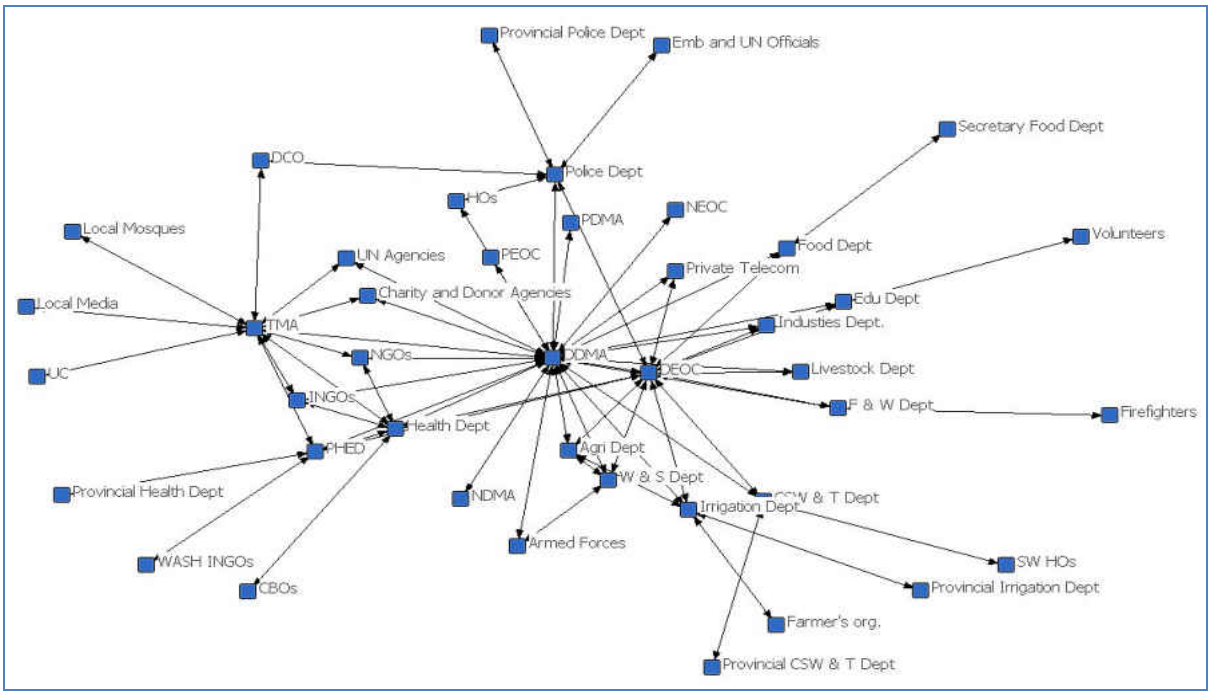

Figure 8 District Disaster Response Planned Network

Through a pictorial representation of the planned response network, the local response is fairly centralized. The response system shown in Figure 8 has a density of 0.079, with a number of ties equal to 136, and an average degree of 3.238. The density of 0.079 shows a sparsely connected network, not a densely connected one. One advantage is that it does not put unnecessary pressures of coordination on many organizations (Provan et al., 2007), although it does restrict communication flows and information and resource exchange within the network (Rowley, 1997).

Figure 9 shows a response system where a DEOC has not been activated, a highly likely scenario since the district level governments do not have the operational capacity to activate a fully functional DEOC, nor function or operate DDMAs. A look into actual response

frameworks will show how the planned response system is different than the emergent, actual response system during the disaster events.

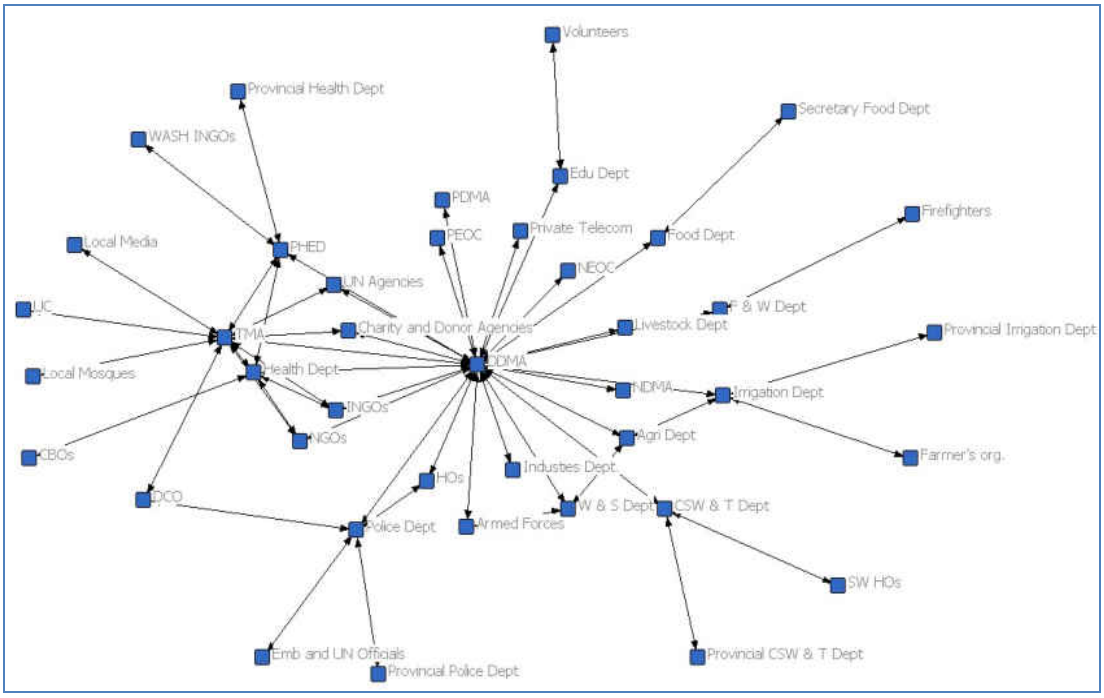

Figure 9 District Disaster Response Planned Network (without a DEOC activated)

According to the Freeman's degree centrality measures, the DDMA is the most central organization, followed by the DEOC and TMA. The results for degree centrality are shown in Table 7. According to the plan the DCO or TMA head leads the DDMA so they would be playing the most central role. It is important to understand that these agency heads on a regular basis manage the day to day functions in the districts. Thus during disasters they are expected to lead the disaster management and coordination efforts as well. Instead of the hiring professional emergency managers at the district level, the districts (due to the lack of capacity and funds) rely on DCOs to manage disasters.

Table 7 Degree Centrality Scores of District Level Planned Response System

	Degree	NrmDegree	Share
DDMA	25.000	60.976	0.184
DEOC	14.000	34.146	0.103
TMA	11.000	26.829	0.081
Health Dept	7.000	17.073	0.051
Police Dept	6.000	14.634	0.044
PHED	6.000	14.634	0.044
Irrigation Dept	5.000	12.195	0.037
Agri Dept	4.000	9.756	0.029
W & S Dept	4.000	9.756	0.029
CSW & T Dept	4.000	9.756	0.029
INGOs	3.000	7.317	0.022
NGOs	3.000	7.317	0.022
F & W Dept	3.000	7.317	0.022
Food Dept	3.000	7.317	0.022
Edu Dept	3.000	7.317	0.022
Industries Dept.	2.000	4.878	0.015
Armed Forces	2.000	4.878	0.015
DCO	2.000	4.878	0.015
Livestock Dept	2.000	4.878	0.015
UN Agencies	2.000	4.878	0.015
HOs	2.000	4.878	0.015
Charity and Donor Agencies	2.000	4.878	0.015
Private Telecom	2.000	4.878	0.015
Firefighters	1.000	2.439	0.007
CBOs	1.000	2.439	0.007
Farmer's org.	1.000	2.439	0.007
Emb and UN Officials	1.000	2.439	0.007
NDMA	1.000	2.439	0.007
Local Media	1.000	2.439	0.007
Provincial CSW & T Dept	1.000	2.439	0.007
Provincial Health Dept	1.000	2.439	0.007
Provincial Police Dept	1.000	2.439	0.007
Provincial Irrigation Dept	1.000	2.439	0.007
NEOC	1.000	2.439	0.007
Secretary Food Dept	1.000	2.439	0.007
SW HOs	1.000	2.439	0.007
PDMA	1.000	2.439	0.007
PEOC	1.000	2.439	0.007
UC	1.000	2.439	0.007
Volunteers	1.000	2.439	0.007
WASH INGOs	1.000	2.439	0.007
Local Mosques	1.000	2.439	0.007

Also according to freeman's degree centrality measures the overall network centralization is 55.73%. The planned network does show that few organizations such as the DDMA, DEOC, and TMA are centrally located and are powerful entities in terms of controlling resources and determining information and resource exchanges between other organizations within the network.

Other centrality measures such as betweeness and closeness/eigenvector results are shown in the Table 8 below. These results also show that DDMA, DEOC, TMA, and also the Punjab Health Department (PHD) (with a high eigenvector centrality score) have the power to mobilize other responding agencies within the planned district level network. These central players enjoy control and power over others in the network and are perhaps capable for managing resource and information flows. However, it is interesting to note that with positional power comes the responsibility to bridge others by providing access to sources of information and resources (Prell et al., 2009). Thus, these central players in the planned network require the capacity and capabilities to lead an effective response operation. Currently with the existing institutional structure in place, the DCOs are unable to lead DDMAs and activate fully functional DEOCs. Major investment is needed to implement these frameworks in districts. In Punjab most of the rural areas of Punjab were devastated with the 2010 Floods and some of these were experiencing floods of this extent for the first time. According to General Nadeem, the NDMA Chief, most local districts that experience monsoon rains every year take measures to mitigate the threat and prepare accordingly. However, in 2010 Floods, due to climate change, previous years' deforestation, and flashfloods some areas were totally taken by surprise.

Table 8 Centrality scores of the District Level Planned Network

	Degree	Eigenve	Between
Agri Dept	4.000	0.184	1.000
Armed Forces	2.000	0.104	0.000
CBOs	1.000	0.036	0.000
Charity and Donor Agencies	2.000	0.115	0.000
CSW & T Dept	4.000	0.140	79.000
DCO	2.000	0.059	6.000
DDMA	25.000	0.548	534.500
DEOC	14.000	0.384	142.167
Edu Dept	3.000	0.137	40.000
Emb and UN Officials	1.000	0.024	0.000
Farmer's org.	1.000	0.024	0.000
Firefighters	1.000	0.020	0.000
Food Dept	3.000	0.137	40.000
F & W Dept	3.000	0.137	40.000
Health Dept	7.000	0.250	44.667
HOs	2.000	0.103	0.000
Industries Dept.	2.000	0.134	0.000
INGOs	3.000	0.151	0.000
Irrigation Dept	5.000	0.168	79.000
Livestock Dept	2.000	0.134	0.000
Local Mosques	1.000	0.036	0.000
Local Media	1.000	0.036	0.000
NDMA	1.000	0.079	0.000
NEOC	1.000	0.079	0.000
NGOs	3.000	0.151	0.000
Private Telecom	2.000	0.134	0.000
PDMA	1.000	0.079	0.000
PEOC	1.000	0.079	0.000
Police Dept	6.000	0.165	95.833
Provincial CSW & T Dept	1.000	0.020	0.000
Provincial Health Dept	1.000	0.031	0.000
Provincial Police Dept	1.000	0.024	0.000
Provincial Irrigation Dept	1.000	0.024	0.000
PHED	6.000	0.215	80.333
Secretary Food Dept	1.000	0.020	0.000
SW HOs	1.000	0.020	0.000
TMA	11.000	0.247	144.500
UN Agencies	2.000	0.115	0.000
UC	1.000	0.036	0.000
Volunteers	1.000	0.020	0.000
WASH INGOs	1.000	0.031	0.000
W & S Dept	4.000	0.176	1.000

Clique analysis was also carried out on the planned network to show the types of preferred cliques and subgroups in the recommended district level response system. The Results of the clique analysis are shown in Table 9.

Table 9 Clique Analysis in District Planned Network

18 cliques found.
1: Agri Dept DDMA DEOC Irrigation Dept
2: Agri Dept DDMA DEOC W & S Dept
3: CSW & T Dept DDMA DEOC
4: DDMA DEOC Edu Dept
5: DDMA DEOC Food Dept
6: DDMA DEOC F & W Dept
7: DDMA DEOC Health Dept PHED
8: DDMA DEOC Industries Dept.
9: DDMA DEOC Livestock Dept
10: DDMA DEOC Private Telecom
11: DDMA DEOC Police Dept
12: Charity and Donor Agencies DDMA TMA
13: Armed Forces DDMA W & S Dept
14: DDMA HOs Police Dept
15: DDMA Health Dept INGOs TMA
16: DDMA Health Dept NGOs TMA
17: DDMA Health Dept PHED TMA
18: DDMA TMA UN Agencies

With 18 cliques identified in the planned network, there seems to be a great deal of collaborative activity taking place with DDMA and DEOC as the common members in most cliques. To get a clearer picture on clique membership overlap the results for the Hierarchical Clustering of the Overlap Matrix were also analyzed. It is observed that DDMA and DEOC are close to each other since they share 11 clique memberships in common. This makes sense since DDMA is tasked to activate DEOC. Another interesting finding is that the TMA and Health Department share 3 clique memberships in common as well.

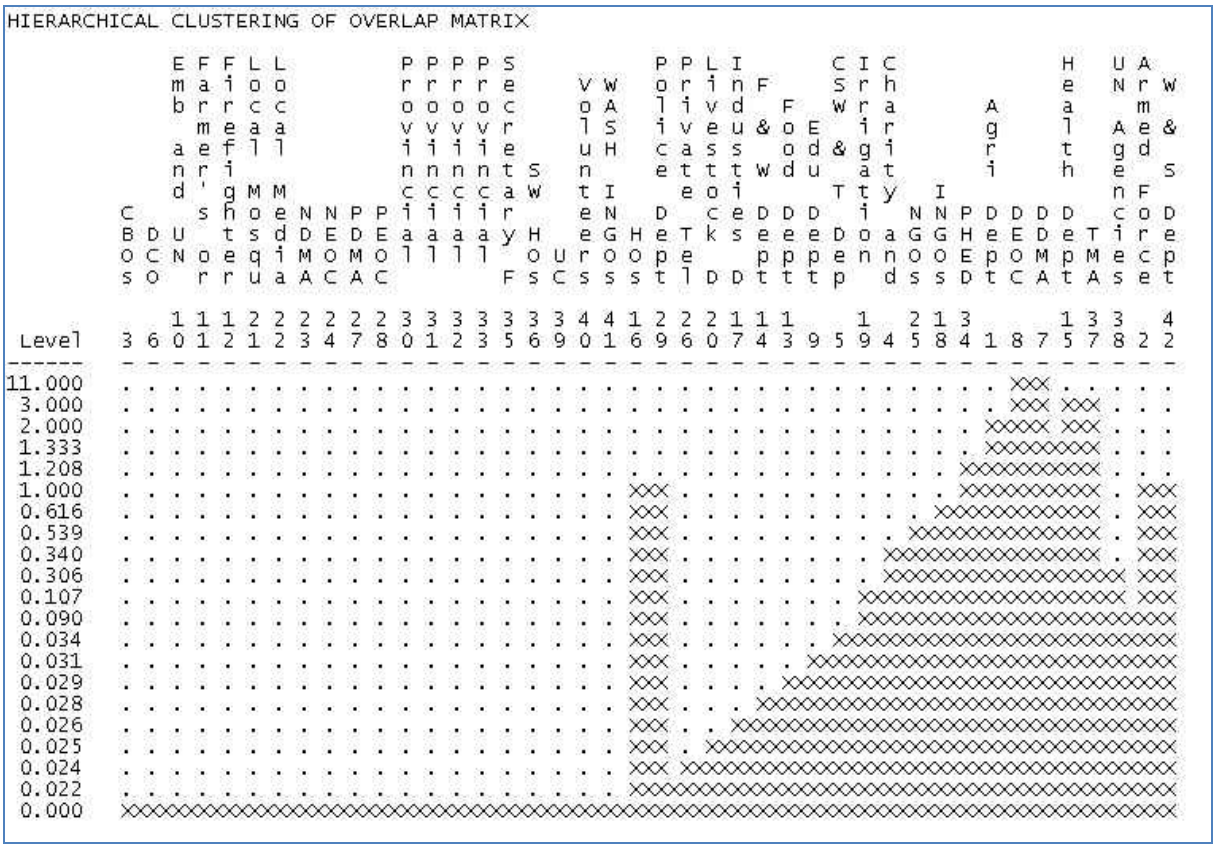

Figure 10 Hierarchical Clustering of Overlap Matrix in the District Planned Response Network

The cliques show the types of recommended coordination and collaborative response subgroups that need to exist in the actual response. This list of cliques will be compared with the actual cliques found in districts to see if the planned collaborative activities were taking place or not. This will help to gauge whether the response was collaborative and effective.

Thus, overall the planned district level response network depicts a centralized network lead by either the DDMA/DEOC and also the TMA and shows collaborative activity around these players through clique analysis results. The Punjab Health Department (PHD) is also playing an important role in mobilizing other relevant players within the planned network.

5.1.2 District Muzzafargarh Response Network/System

Muzzafargarh district is a district in south Punjab that has a population of more than 3,800,000 people. The district is divided into four *Tehsils*: Alipur, Jatoi, Kot Addu and Muzaffargarh. As discussed earlier, Muzaffargarh was one of the districts that suffered the most during the 2010 floods. A total of 323 villages were affected in the district (PDMA, 2013). Also in less than a month, over 10,000 people were evacuated in the district and many relief camps were established for the displaced and the evacuees. Through content analysis of newspapers, it was found that the Pakistan Army played a crucial role in evacuating the affected population in the district. The following figure shows the response network in Muzaffargarh District.

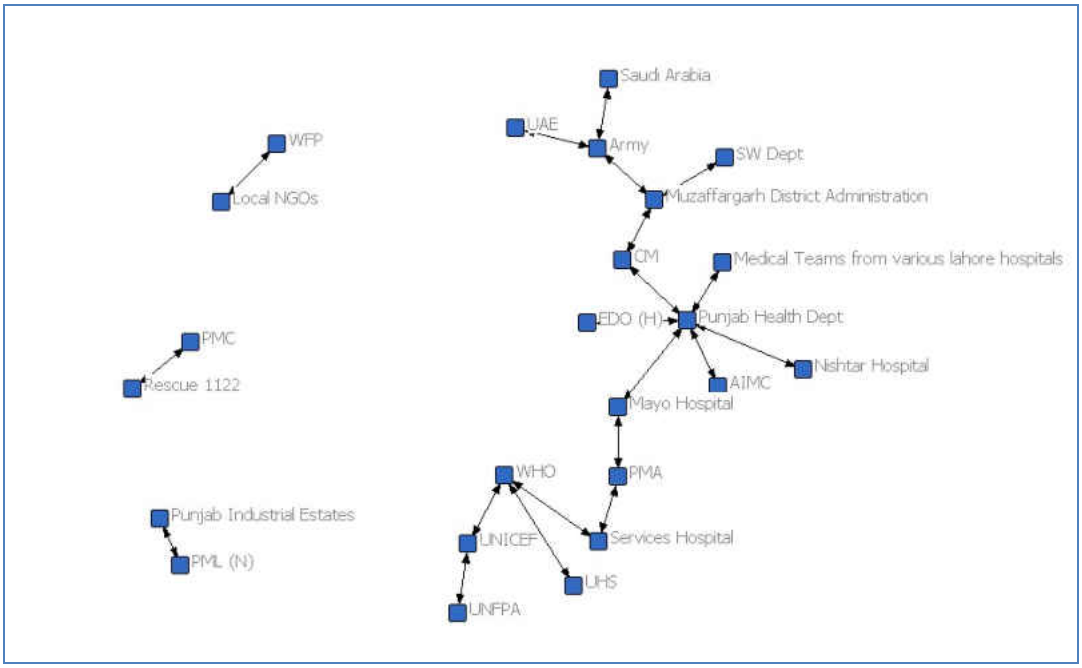

Figure 11 Muzzafargarh Response Network

The response network arrived at through content analysis reflects a very scattered network with different subgroups and a number of isolated players albeit important players such

as the Irrigation Department, the Commissioner of Muzaffargarh, Pakistan Red Cross Society (PRCS). Such important players as isolates shows that the network formed through content analysis may not show the complete picture. However, it does provide important information such as the response network is highly dispersed and fairly decentralized, a finding in contrast with the planned district response system developed through the NDRP of 2010. The overall density of the network is = 0.027 with an average degree as 1.026 and the number of ties to be 40. This is a sparsely connected response network with a network centralization of 13.798%. Thus, a decentralized network shows that there are not any powerful and dominant players in the network that are leading the overall response efforts in the district.

5.1.2.1 Key Players in the Network

In order to get information on the most central and powerful players in the response network, centrality measures were applied. According to the centrality measures applied in Table 10, 11, and 12 (degree, closeness, betweenness) the most powerful organization in the network is the Punjab Health Department (PHD), not the Muzzafargarh District Administration/ DCO. According to the degree centrality scores – the power of the Muzzafargarh District Administration is the same as that of the Army or WHO.

The Army in this network actually entails not a single organization or a unit. Through content analysis it was reflected that the Army is actually playing a very important role in response operations. The Army in the network not only includes Army Corps arranging for the distribution of relief or evacuating civilians but also includes Army personnel managing camps, Army Engineers restoring damaged infrastructure, ISPR providing information, and the Chief of

Army Staff visiting impacted regions. Thus, the network may not be providing the complete picture of the various functions an organization or various units of an organization are playing in response.

Table 10 Centrality scores in Muzzafargarh District

	Degree	NrmDegree	Share
Punjab Health Dept	6.000	15.789	0.150
WHO	3.000	7.895	0.075
Army	3.000	7.895	0.075
Muzaffargarh District Administration	3.000	7.895	0.075
Mayo Hospital	2.000	5.263	0.050
UNICEF	2.000	5.263	0.050
CM	2.000	5.263	0.050
PMA	2.000	5.263	0.050
Services Hospital	2.000	5.263	0.050
Medical Teams from various lahore hospitals	1.000	2.632	0.025
SW Dept	1.000	2.632	0.025
Nishtar Hospital	1.000	2.632	0.025
Saudi Arabia	1.000	2.632	0.025
AIMC	1.000	2.632	0.025
UAE	1.000	2.632	0.025
UNFPA	1.000	2.632	0.025
UHS	1.000	2.632	0.025
PML (N)	1.000	2.632	0.025
Local NGOs	1.000	2.632	0.025
EDO (H)	1.000	2.632	0.025
Rescue 1122	1.000	2.632	0.025
PMC	1.000	2.632	0.025
Punjab Industrial Estates	1.000	2.632	0.025
WFP	1.000	2.632	0.025

Also through the results of the various centrality measures it can be determined that the medical relief and health-related response operations are the central response function in this network. This is an important finding. Through content analysis, and a detailed study of what types of agencies were involved in the different response activities – it was identified that the

distribution of food and NFIs is not difficult to arrange and many organizations isolated in the network such as the Edhi Foundation visit the impacted areas and provide relief directly, without having to go through any bureaucratic procedure or formal channels involving government authorities. Moreover, response functions such as conducting situation analysis and provision of funds and donations also do not require extensive collaborations. However, the provision of medical relief does require coordination and collaboration amongst a number of health-related agencies and organizations. This reflects strong organizational resource dependencies in the case of medical relief provision.

Table 11 Descriptive Statistics for Degree Centrality Scores in Muzaffargarh

DESCRIPTIVE STATISTICS

	Degree	NrmDegree	Share
Mean	1.026	2.699	0.026
Std Dev	1.209	3.181	0.030
Sum	40.000	105.263	1.000
Variance	1.461	10.117	0.001
SSQ	98.000	678.670	0.061
MCSSQ	56.974	394.559	0.036
Euc Norm	9.899	26.051	0.247
Minimum	0.000	0.000	0.000
Maximum	6.000	15.789	0.150
N of Obs	39.000	39.000	39.000

Network Centralization = 13.80%
Blau Heterogeneity = 6.13%.
Normalized (IQV) = 3.65%

Table 11 also shows a decentralized network according to Freeman's degree centrality measure. The mean degree score and the variance scores are both very low indicating a decentralized structure with less power differentials as the maximum score for degree centrality

is only 6. Closeness centrality scores are reflected through the Betweenness centrality scores in Table 12 and indicate that the Punjab Health Department (PHD) is clearly an agency serving as the focal agency of contact and playing a role of a broker linking other agencies and resources.

Table 12 Betweeness Centrality Results

Punjab Health Department	100.00
Mayo Hospital	66.00
Chief Minister Punjab (CM)	60.00
Pakistan Medical Association (PMA)	60.00
Muzaffargarh District Administration	55.00
Services Hospital	52.00
WHO	44.00
Army	31.00
UNICEF	16.00

Sometimes a network needs to be highly decentralized and disconnected so that various subgroups and cliques can be developed to focus on varied response operations and functions. A Clique Analysis shows whether the subgroups in the network are performing specific response functions by working together in cohesive and collaborative groups. The results for the clique analysis show that there were no cliques in the network which reflects a highly scattered network and less collaborative one, while the planned network discussed earlier clearly indicates the presence of collaborative sub-groups within the network.

5.1.3 District Dera Ghazi Khan Response Network/System

Dera Ghazi Khan (DG Khan) district is divided into two main *Tehsils*: Dera Ghazi Khan and Taunsa Sharif. DG Khan was one of the worst affected districts out of the 78 districts

impacted. As discussed earlier it incurred losses of over Rs. 10 billion (PDMA, 2013). Figure 12 shows the response network in DG Khan district.

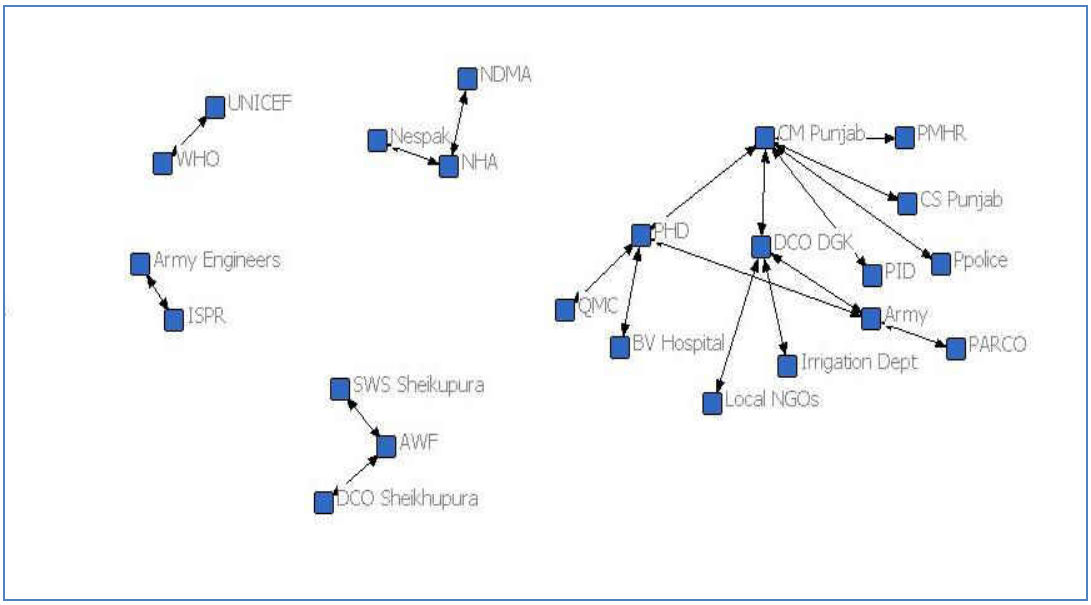

Figure 12 Response Network in District DG Khan

The response network in DG Khan is clearly scattered and dispersed into isolated response clusters. Apart from the clearly isolated players such as the Pakistan Air Force (PAF), PRCS, and WFP, there are a number of agencies that are collaborating or coordinating with one or two players and lie outside the central response network. Due to these scattered response activities, the response network has a network centralization of 17.01%, depicting a highly decentralized network, compared to the 55.73% centralization in the planned district response system. Similarly, the density of the network is also very low with a density score of = 0.041, number of ties = 38, and average degree = 1.226. However, if the connected network in the sociogram is observed and examined, there are some parallels that can be drawn with the planned network. A DDMA is essentially run by the head of the district government and the DCO of DG

Khan lies at the center of the connected part of the network. The DCO is also directly connected to important players such as the Armed Forces, the Irrigation Department, Local NGOs, and the Chief Minister of Punjab (the CM's Relief Fund also providing funding to impacted districts).

5.1.3.1. Key Players in the Response System

In order to get information on the most central and powerful players in the response network, centrality measures were applied. Table 13 identifies the central players in the network.

Table 13 Degree Centrality Results

	Degree	NrmDegree	Share
CM Punjab	6.000	20.000	0.158
DCO DGK	4.000	13.333	0.105
PHD	4.000	13.333	0.105
Army	3.000	10.000	0.079
AWF	2.000	6.667	0.053
NHA	2.000	6.667	0.053
PARCO	1.000	3.333	0.026
Army Engineers	1.000	3.333	0.026
DCO Sheikhupura	1.000	3.333	0.026
Irrigation Dept	1.000	3.333	0.026
ISPR	1.000	3.333	0.026
SWS Sheikupura	1.000	3.333	0.026
NDMA	1.000	3.333	0.026
Nespak	1.000	3.333	0.026
BV Hospital	1.000	3.333	0.026
PMHR	1.000	3.333	0.026
CS Punjab	1.000	3.333	0.026
UNICEF	1.000	3.333	0.026
Ppolice	1.000	3.333	0.026
QMC	1.000	3.333	0.026
PID	1.000	3.333	0.026
Local NGOs	1.000	3.333	0.026
WHO	1.000	3.333	0.026

According to the degree centrality measures, the most embedded player in the network is the CM of Punjab. He is the most influential and powerful player in the network and has access

to many resources and information. The DCO DG Khan and PHD also have a central role to play in the connected network.

Table 14 Eigenvector Centrality Results

	Eigenvec	nEigenvec
APTMA	0.000	0.000
AWF	-0.000	-0.000
Army	0.326	46.047
Army Engineers	0.000	0.000
CS Punjab	0.195	27.618
CM Punjab	0.559	79.029
DCO DGK	0.409	57.836
DGK Comm	0.000	0.000
HHRD	0.000	0.000
Irrigation Dept	0.143	20.212
ISPR	0.000	0.000
NHA	0.000	0.000
NDMA	0.000	0.000
Nespak	0.000	0.000
PAF	0.000	0.000
Lahore Corps	-1.2E-004	3-1.7E-004
PML-Q	0.000	0.000
PRCS	-0.000	-0.000
PMHR	0.195	27.618
PHD	0.409	57.836
PID	0.195	27.618
Ppolice	0.195	27.618
DCO Sheikhupura	0.000	0.000
SWS Sheikupura	-0.000	-0.000
UNICEF	-0.000	-0.000
WFP	0.000	0.000
WHO	0.000	0.000
Local NGOs	0.143	20.212
QMC	0.143	20.212
BV Hospital	0.143	20.212
PARCO	0.114	16.092

Eigenvector centrality results in Table 14 show how agencies differ in their power to mobilize others. According to the eigenvector results, the CM Punjab and the DCO DGK have the highest eigenvector values in the network. Similar results are found for the betweenness centrality measures.

Freeman's betweenness scores provide similar results when the CM Punjab, District government of DG Khan headed by the DCO and the PHD play the most focal roles of connecting agencies and brokering relationships for resource mobilization and exchange in the response system.

Table 15 Betweeness Centrality Results for DG Khan

	Betweenness	nBetweenness
CM Punjab	42.500	9.770
DCO DGK	26.000	5.977
PHD	26.000	5.977
Army	15.500	3.563
AWF	1.000	0.230
NHA	1.000	0.230

A clique analysis was run to find out that there exist no cliques in this district response network as well. The N-clique analysis was then carried out to relax the assumption of all actors connected to each other. At the 2-clique level, 7 cliques were found. These results show that the most of the important players at the district level are included in network and involved in various cliques/sub-networks performing important response functions. These players are: CM Punjab, the Armed Forces, and DCO D G Khan.

Table 16 Clique Analysis Results for DG Khan

7 2-cliques found. 1: CS Punjab CM Punjab DCO DGK PMHR PHD PID Ppolice 2: Army CM Punjab DCO DGK PHD 3: Army CM Punjab DCO DGK Irrigation Dept Local NGOs 4: Army CM Punjab PHD QMC BV Hospital 5: AWF DCO Sheikhupura SWS Sheikupura 6: NHA NDMA Nespak 7: Army DCO DGK PHD PARCO

Another key finding from the clique analysis shows that the presence on humanitarian agencies especially INGOs and multilateral UN agencies is missing in field work. The Army is partnering closely with the provincial and district government and also local NGOs but INGOs and UN agencies are missing. A senior official from the Public Relations office of the Pakistan Army, who was involved in the Pakistan Floods emphasized that the Army was collaborating with the civil administration as well as NGOs in the field. "At the federal level the Army was closely partnering with the NDMA, at the provincial levels the respective PDMAs and at the district level the district administrations". Also he suggested that "as per the constitution of Pakistan, the Army is always called in to provide relief by civil administration if they feel that they need assistance in the case of an emergency or a natural disaster" (Senior Official of Armed Forces, Personal Communication, September 25, 2013).

5.2 Provincial Level Response to the 2010 Floods

The 2010 NDRP for Pakistan includes a detailed appendix of the SOPs for provincial level organizations and agencies. Appendix C provides the SOPs for the response phase of provincial level agencies as provided in the NDRP of 2010. Through a document analysis and a

thorough review of the SOPs, SNA was utilized to develop the planned response framework for provincial level response. The planned response network is shown in the Figure 13 below.

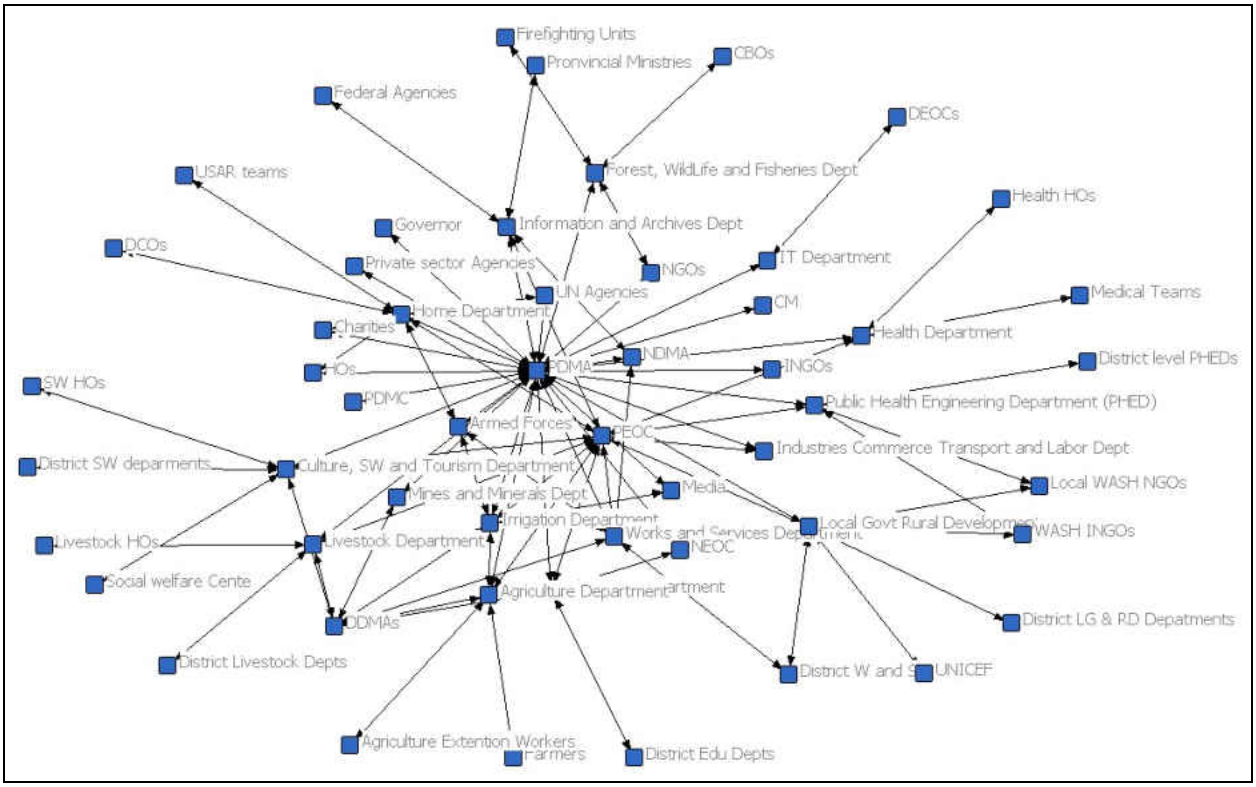

Figure 13 Planned Provincial Level Response Network

The planned provincial response system is a fairly centralized structure with a network centralization of 48.69%. Its density is low with a total density score of 0.059 with a number of total ties of 170 and an average degree of 3.148. The most central player from the visualization is the PDMA, being closely followed by the PEOC. The PEOC is the provincial emergency operations center that is mainly activated through, and by the PDMA. This essentially makes PDMA the most powerful organization in the planned response system.

Table 17 Planned Response Network Centrality Scores

	Degree	Eigenvector	Betweenness
PDMA	28.000	0.553	975.418
Health Department	4.000	0.133	104.056
Public Health Engineering Department (PHED)	5.000	0.143	99.319
Education Department	5.000	0.174	59.897
Agriculture Department	6.000	0.196	108.897
Livestock Department	5.000	0.161	108.897
Irrigation Department	6.000	0.227	12.430
Works and Services Department	6.000	0.209	36.233
Local Govt Rural Development	7.000	0.155	172.993
Culture, SW and Tourism Department	6.000	0.165	158.897
Home Department	8.000	0.213	110.389
Forest, WildLife and Fisheries Dept	4.000	0.101	103.000
IT Department	2.000	0.084	52.000
Industries Commerce Transport and Labor Dept	2.000	0.127	1.056
Information and Archives Dept	5.000	0.154	104.556
Mines and Minerals Dept	2.000	0.109	3.381
NEOC	2.000	0.108	0.000
PDMC	1.000	0.082	0.000
NDMA	3.000	0.136	1.814
Armed Forces	4.000	0.178	3.417
Media	2.000	0.115	0.000
INGOs	1.000	0.082	0.000
NGOs	2.000	0.097	0.000
UN Agencies	2.000	0.113	0.000
Charities	2.000	0.113	0.000
CM	1.000	0.082	0.000
HOs	2.000	0.113	0.000
Governor	1.000	0.082	0.000
Private sector Agencies	1.000	0.082	0.000
PEOC	12.000	0.305	213.846
Medical Teams	1.000	0.020	0.000
Health HOs	1.000	0.020	0.000
District level PHEDs	1.000	0.021	0.000
Local WASH NGOs	2.000	0.044	1.833
WASH INGOs	2.000	0.044	1.833
DDMAs	7.000	0.184	35.150
District Edu Depts	1.000	0.026	0.000
Farmers	1.000	0.029	0.000
Agriculture Extention Workers	1.000	0.029	0.000
District Livestock Depts	1.000	0.024	0.000

	Degree	Eigenvector	Betweenness
Livestock HOs	1.000	0.024	0.000
District W and SD	2.000	0.054	1.688
District LG & RD Depatments	1.000	0.023	0.000
UNICEF	1.000	0.023	0.000
District SW deparments	1.000	0.024	0.000
Social welfare Cente	1.000	0.024	0.000
USAR teams	1.000	0.032	0.000
CBOs	1.000	0.015	0.000
Firefighting Units	1.000	0.015	0.000
Federal Agencies	1.000	0.023	0.000
Provincial Ministries	1.000	0.023	0.000
SW HOs	1.000	0.024	0.000
DCOs	1.000	0.032	0.000
DEOCs	1.000	0.012	0.000

Centrality results also depict that PDMA is the most influential player in the response network. It has a large control over other players and resource and information flows. With the high level of positional power, it is assumed that the PDMA has the capacity to function in the planned position depicted through the network.

In terms of the functional response, the Punjab Monsoon Contingency Plan of 2012 identifies different organizations carrying out different response functions. The plan identified the Rescue 1122, Punjab Police, and the Civil Defense Authorities to be responsible for search and rescue and evacuation operations; the relief management functions to be mobilized and implemented by the Health Department, Social Welfare Department (SWD), and Construction & Works Department (C&W); the monitoring of risk prone regions to be carried out by the Meteorological Department, Irrigation Department, Water and Power Development Authority (WAPDA) and the Water and Sanitation Authority (WASA); Communication and media

information management needs to be coordinated by PDMA and the Information Department (NDMA, 2012). The existence of these functional partnerships during actual response will be analyzed to gauge whether response was collaborative and effective. Let me now compare this with the actual provincial response network that emerged during the 2010 Floods.

5.2.1 Provincial Response Network/System

Although the country has experienced flooding every year after 2010, 2010 remains to be the worst year of flooding for the Punjab province. The results of SNA are observed at the provincial level only describing the network that exists at the provincial level and excluding the resource exchanges and relationships that exist between provincial actors that are categorically operating in the local arena or transactions and interactions that are taking place at the district level. To ensure that only the provincial level response network is captured, all local level interactions and transactions are excluded from this analysis.

The provincial network below shows a fairly decentralized network with few central and powerful players. The network centralization score is 19.54% and according to density measures, the average number of ties within the network are only: 0.018, with the total number of ties equaling 144. Therefore this seems to be a clearly less dense network. The Figure 14 shows strong hubs within the network. The identified hubs that are observed from the figure are: CM Punjab, Health Department, PRCS, and UNICEF.

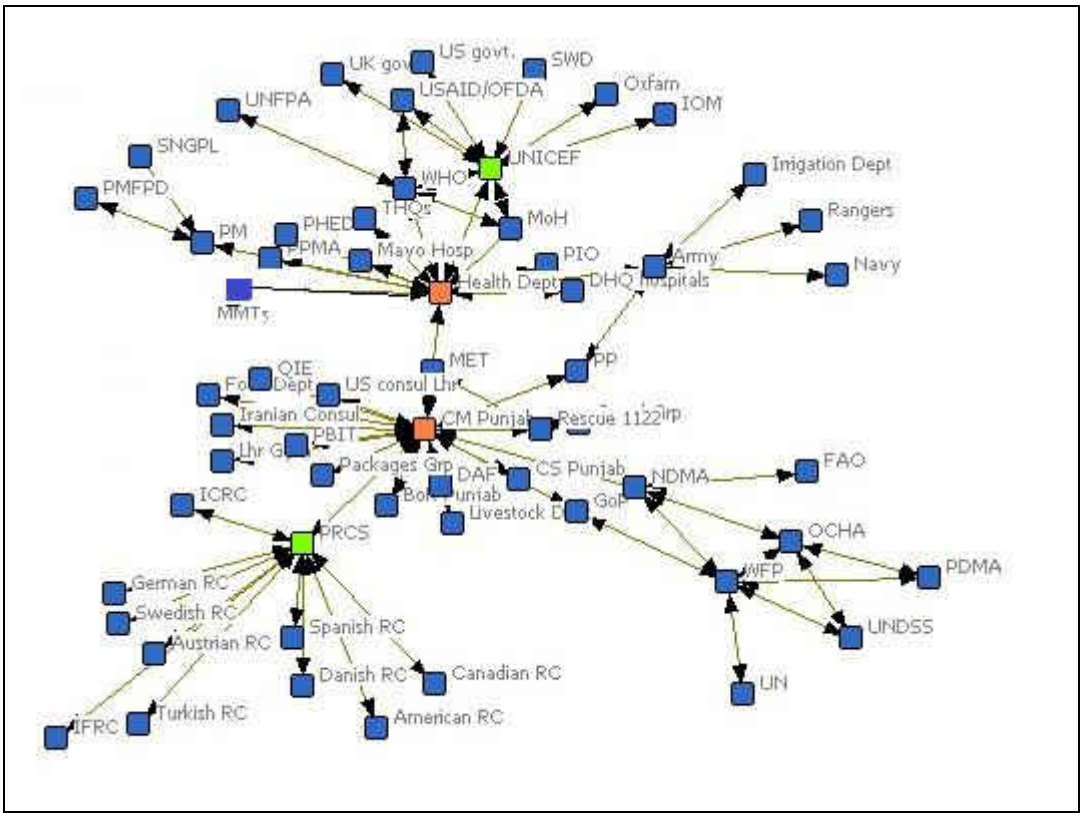

Figure 14 Provincial Disaster Response Network

According to freeman's degree centrality measures the most central player is the CM of Punjab with the degree centrality of 19. The Punjab Health Department (PHD) is also one of the key central players at the provincial level of response (degree centrality of 13) closely being followed by the Pakistan Red Crescent Society (PRCS). Similar results are shown for eigenvector and betweeness centrality. PDMA, on the other hand is not playing a central role in the emergent network.

Table 18 Centrality Scores of the Provincial Response Network

	Degree	Eigenvec	Between
APTMA	1.000	0.000	0.000
American RC	1.000	0.041	0.000
Austrian RC	1.000	0.041	0.000
BoP	0.000	0.000	0.000
BoR Punjab	1.000	0.115	0.000
Canadian RC	1.000	0.041	0.000
Caritas	0.000	0.000	0.000
CS Punjab	1.000	0.115	0.000
CM Punjab	19.000	0.555	1313.500
Danish RC	1.000	0.041	0.000
Livestock Dept	1.000	0.115	0.000
DAF	1.000	0.115	0.000
DHQ hospitals	1.000	0.082	0.000
FeI	1.000	0.000	0.000
FAP	0.000	0.000	0.000
FFD	0.000	0.000	0.000
FAO	1.000	0.032	0.000
German RC	1.000	0.041	0.000
GoP	2.000	0.133	86.667
Governor Punjab	1.000	0.000	0.000
Guard Grp	1.000	0.115	0.000
HHRD	0.000	0.000	0.000
ICRC	1.000	0.041	0.000
IFRC	1.000	0.041	0.000
IOM	1.000	0.045	0.000
Iranian Consul	1.000	0.115	0.000
JuD	1.000	0.000	0.000
Lhr CoC	1.000	0.000	0.000
Lhr Gym	1.000	0.115	0.000
Mayo Hosp	1.000	0.082	0.000
MoFA	1.000	0.000	0.000
MoH	3.000	0.165	0.000
MoLPA	1.000	0.000	0.000
MoF	0.000	0.000	0.000
MMTs	1.000	0.082	0.000
NDMA	4.000	0.153	231.333
OCHA	4.000	0.063	37.167
Oxfam	1.000	0.045	0.000
Packages Grp	1.000	0.115	0.000
Army	5.000	0.127	181.500
MET	2.000	0.145	0.000
Navy	1.000	0.026	0.000
PPP	1.000	0.000	0.000
PPMA	1.000	0.082	0.000
Rangers	1.000	0.026	0.000

	Degree	Eigenvec	Between
PDMA	2.000	0.031	0.000
PLF	0.000	0.000	0.000
PM	3.000	0.090	115.000
PML-Q	0.000	0.000	0.000
PRCS	11.000	0.200	535.000
PDA	0.000	0.000	0.000
PIO	1.000	0.082	0.000
PHED	1.000	0.082	0.000
Agri. Dept.	0.000	0.000	0.000
PBIT	1.000	0.115	0.000
Punjab Cabinet	1.000	0.000	0.000
Food Dept.	1.000	0.115	0.000
PEF	0.000	0.000	0.000
EPD	0.000	0.000	0.000
FRC	0.000	0.000	0.000
Governor Punjab	0.000	0.000	0.000
Punjab Goverrment's Relief Fund	0.000	0.000	0.000
Health Dept	13.000	0.395	990.000
Irrigation Dept	1.000	0.026	0.000
PMFPD	1.000	0.019	0.000
PP	2.000	0.141	68.000
Relief Dept	0.000	0.000	0.000
Revenue Dept	1.000	0.000	0.000
PWC	0.000	0.000	0.000
QIE	1.000	0.115	0.000
Rajanpur ROD	0.000	0.000	0.000
R&CMgt	0.000	0.000	0.000
Rescue 1122	2.000	0.145	0.000
Sheikhupura CoCI	0.000	0.000	0.000
SWD	1.000	0.045	0.000
Spanish RC	1.000	0.041	0.000
SSG	0.000	0.000	0.000
SNGPL	2.000	0.024	0.000
Swedish RC	1.000	0.041	0.000
THQs	1.000	0.082	0.000
TMAs	0.000	0.000	0.000
Turkish RC	1.000	0.041	0.000
UK govt	1.000	0.045	0.000
UN	1.000	0.018	0.000
UNDSS	2.000	0.031	0.000
UNFPA	1.000	0.038	0.000
UNICEF	9.000	0.218	305.500
US consul Lhr	1.000	0.115	0.000
US govt.	1.000	0.045	0.000
USAID/OFDA	2.000	0.083	0.000
WFP	6.000	0.089	133.833
WHO	5.000	0.186	83.500

A very important question to ask at this point is that: Why is the CM of Punjab, who is playing a merely peripheral role in the planned response network, playing the most important role in the emergent network – as a leader, as a broker, as the most powerful player? Whereas, the PDMA is playing a peripheral role in the emergent network. First and foremost, the PDMA was established during the Floods and was not available, nor had the capacity, to be involved in the early response and relief operations. One reason for the highest centrality of the CM is attributed to the fact that the CM of Punjab, rather than playing the role of the Chief in charge of the provincial response by calling immediate meetings of relevant line departments and agencies to understand and analyze the situation, is also running a CM's Relief Fund. It is interesting to note that the Governor of Punjab, late Salman Taseer, also arranged a relief fund but was unable to secure many donations. While on the other hand, CM Shahbaz Sharif was able to secure many funds/donations both locally and from abroad. As a result the CM was in a position to call out the shots and lead the relief and response efforts in the Province. Also the CM enjoys a good reputation and is a go-getter and had been proactively involved in visiting flood impacted regions. PDMA, on the other hand is playing a peripheral role since it is fairly new and did not have the capabilities or team to carry out large scale relief efforts. Thus, strong leadership clearly leads to an improved collaborative response. Moreover, a leader with resources to share and distribute is in a very powerful and influential position within the emergent network.

Nasir Mehmood Khosa, the former Chief Secretary of Punjab, worked very closely with the CM of Punjab during the 2010 Floods. He suggests that the CM worked as a true collaborator during the floods working with multiple provincial level departments such as the health department and the revenue departments. Alongside he worked very closely with federal bodies

such as the Armed Forces, the NDMA and relevant donor organizations. He was very quick to reach the local communities and extend them financial support and also monitored the flood situation in the 9 highly affected regions in Punjab (N. M. Khosa, Personal Communication, July 6, 2013).

Table 19 Cliques in the Provincial Response Network

7 cliques found. 1: CM Punjab MET Rescue 1122 2: MoH UNICEF WHO 3: NDMA OCHA WFP 4: OCHA UNDSS WFP 5: OCHA PDMA WFP 6: UNICEF USAID/OFDA WHO 7: Health Dept UNICEF WHO

Through a clique analysis it is found that most cliques contain humanitarian multi-lateral agencies such as WHO, UNICEF, and WFP. The CM is part of one of the cliques and is partnering with Rescue 1122. The CM is not collaborating with any of the multi-lateral agencies. The predominance of multi-lateral agencies and cluster leads in the clique analysis shows that the cluster framework as an institutional framework /or interagency framework for responding is effective. This finding was not fully supported with the information Mr. Nasir Khosa provided. He suggested that the CM was working side-by-side with the UN agencies and other international humanitarian agencies (N. M. Khosa, Personal Communication, July 6, 2013). A major reason why the international agencies were slow to respond to the Floods in the Punjab region was identified by the NDMA Chairman, Nadeem Ahmed. He narrated the difficulties he faced in trying to convince UN agencies to move out of the KPK province to southern provinces

such as Punjab and Sindh. As the disaster was a slow onset disaster and caused havoc and destruction in KPK before the other provinces were affected, most INGOs and charities focused their efforts and relief in the KPK Province. According to the NDMA Chairman once international organizations such as the UN agencies and INGOs start their relief efforts and start mobilizing all their energies and resources in a particular region it is very difficult to convince them to move out to a new, more vulnerable region (N. Ahmed, Personal Communication, September 23, 2013).

5.3 National-International Level Response to the 2010 Floods

This level of disaster response is observed at the international and national level where interactions are either taking place at the international level, such as awareness campaigns and raising funds in other countries, or at the national level involving interactions such as the transfer of donations and funds from foreign countries to Pakistan, or resource sharing and information exchange between government agencies, humanitarian agencies, and INGOs operating at the federal level. This level of observation is referred to as the International-National response network or response system.

Through content analysis of newspapers, both national and international were used (*The News* for national coverage of the disaster response and the *New York Times* and *The Guardian*, which are US and UK based for International coverage of response) in analyzing and developing an emergent response network for the international-national level. Alongside the ReliefWeb database was used to study after-action and situation reports published by UN cluster leaders and other international agencies and national agencies such as the PRCS.

Table 20 Types of Organizations in the National-International Response Network

Type of Organization	*Number of Agencies*
Public Federal/National, State and Local Foreign/International	111 *60* *51*
Nonprofit (including NGOs, INGOs, Charities)	85
Private	29
Multilateral	23
Military-based Federal/National Foreign	13 *7* *6*
Political Parties and affiliated agencies	9
Total	270

As shown in the Table 20, as expected government agencies form a major part of the international and national disaster response system. These departments and agencies are both operating at the international and national level in this system. 60 of the total 111 public sector agencies belong to the Pakistan government. Most of these organizations are federal level departments and ministries that are tasked to operate at the federal level. Some of the agencies operating at the federal level are also state/provincial agencies such as Punjab Chief Minister's Secretariat, Punjab Governor, Provincial Reconstruction, Rehabilitation and Settlement Authority (PaRRSA), PDMAs, and Provincial Health Departments. As expected none of the organizations operating at the federal and international level are local (city or district) level government agencies.

The Pakistan Embassies and High Commission offices in consulates in foreign countries also play an important role in mobilizing resources and funds for disaster response by creating

awareness in other countries about the scale of the disaster and the urgency for response. Although these units and agencies are based outside the country they form an important part of the national government response system.

5.3.1 Planned National Response System

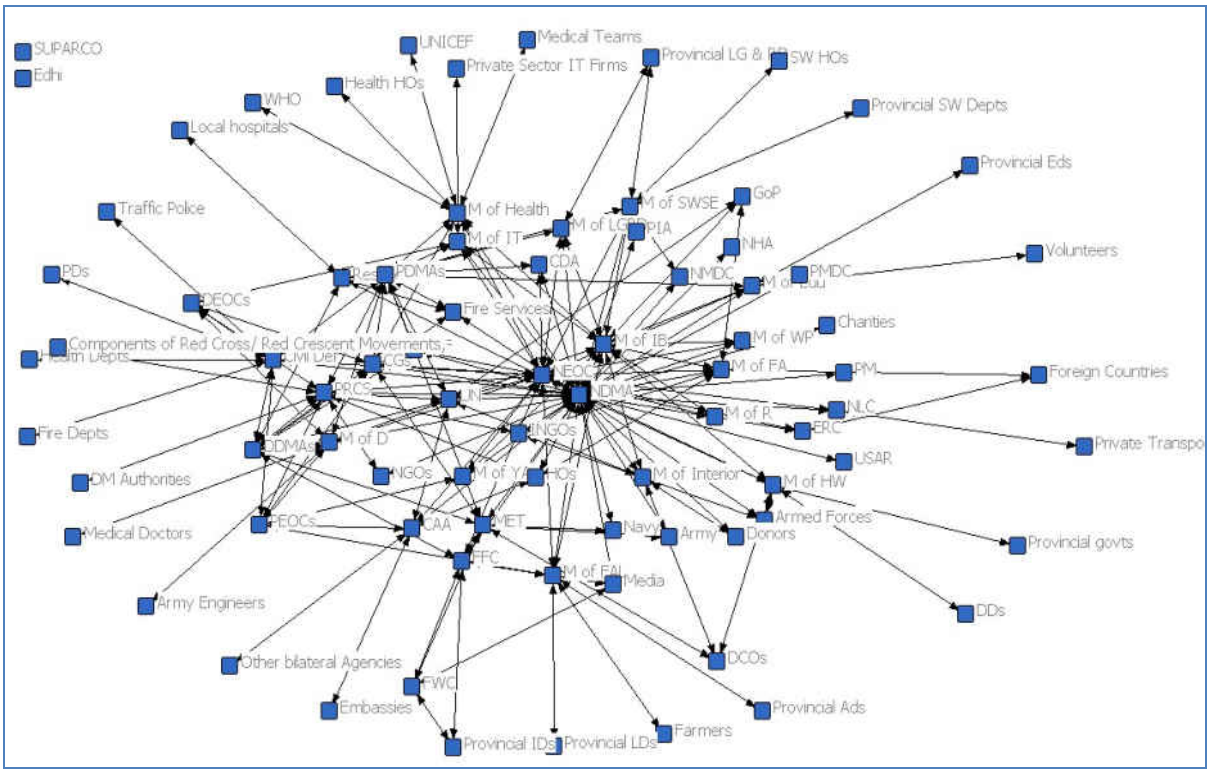

Figure 15 National Planned Response Network

The planned response network/system in Figure 15 also shows a fairly centralized structure with NDMA, NEOC, and Ministry of Information and Broadcasting along with PDMAs playing an integral role in the response phase. Centralization and centrality results for the planned network are shown in Table 21.

Table 21 Centrality Scores of the Planned National Response Network

	Degree	NrmDegree	Share
NDMA	43.000	53.086	0.121
NEOC	23.000	28.395	0.065
PDMAs	15.000	18.519	0.042
M of IB	15.000	18.519	0.042
PRCS	12.000	14.815	0.034
DDMAs	10.000	12.346	0.028
Civil Def	10.000	12.346	0.028
M of FAL	9.000	11.111	0.025
M of D	9.000	11.111	0.025
MET	9.000	11.111	0.025
M of Health	9.000	11.111	0.025
UN	8.000	9.877	0.022
M of SWSE	8.000	9.877	0.022
CGs	8.000	9.877	0.022
M of HW	7.000	8.642	0.020
FFC	7.000	8.642	0.020
CAA	7.000	8.642	0.020
M of FA	7.000	8.642	0.020
PEOCs	7.000	8.642	0.020
M of Interior	7.000	8.642	0.020
M of IT	6.000	7.407	0.017
M of Edu	6.000	7.407	0.017
DEOCs	5.000	6.173	0.014
Rescue 1122	5.000	6.173	0.014
M of LGRD	5.000	6.173	0.014

The descriptive statistics shown in Table 22 depict a high level of variance and thus reflects a fairly centralized structure with few players having more advantaged and powerful positions in the network. The centralization figure of 48.92% also depicts a highly centralized network system. A centralized network may not always be a desired quality in huge response network such as an international-national response network. Also clique analysis show 61 cliques that reflect a highly collaborative structure.

Thus, although the planned system is clearly centralized depicting a top-down management style, the 61 cliques within the network reflect a high level of collaborative activity. Moreover, the UN cluster approach is also a top-down approach but the break-down of response into specific response functions such as Food Security, Shelter, Health, Water and Sanitation makes the system effective in ensuring coordination between responding agencies is taking place and response is collaborative leading to less wastage and duplication of resources.

Table 22 Freeman's Centrality Descriptive Statistics for Planned National Response Network

DESCRIPTIVE STATISTICS

	Degree	NrmDegree	Share
Mean	4.341	5.360	0.012
Std Dev	5.869	7.246	0.016
Sum	356.000	439.506	1.000
Variance	34.444	52.499	0.000
SSQ	4370.000	6660.570	0.034
MCSSQ	2824.439	4304.891	0.022
Euc Norm	66.106	81.612	0.186
Minimum	0.000	0.000	0.000
Maximum	43.000	53.086	0.121
N of Obs	82.000	82.000	82.000

Network Centralization = 48.92%
Blau Heterogeneity = 3.45%.
Normalized (IQV) = 2.26%

5.3.2 National-International Response System

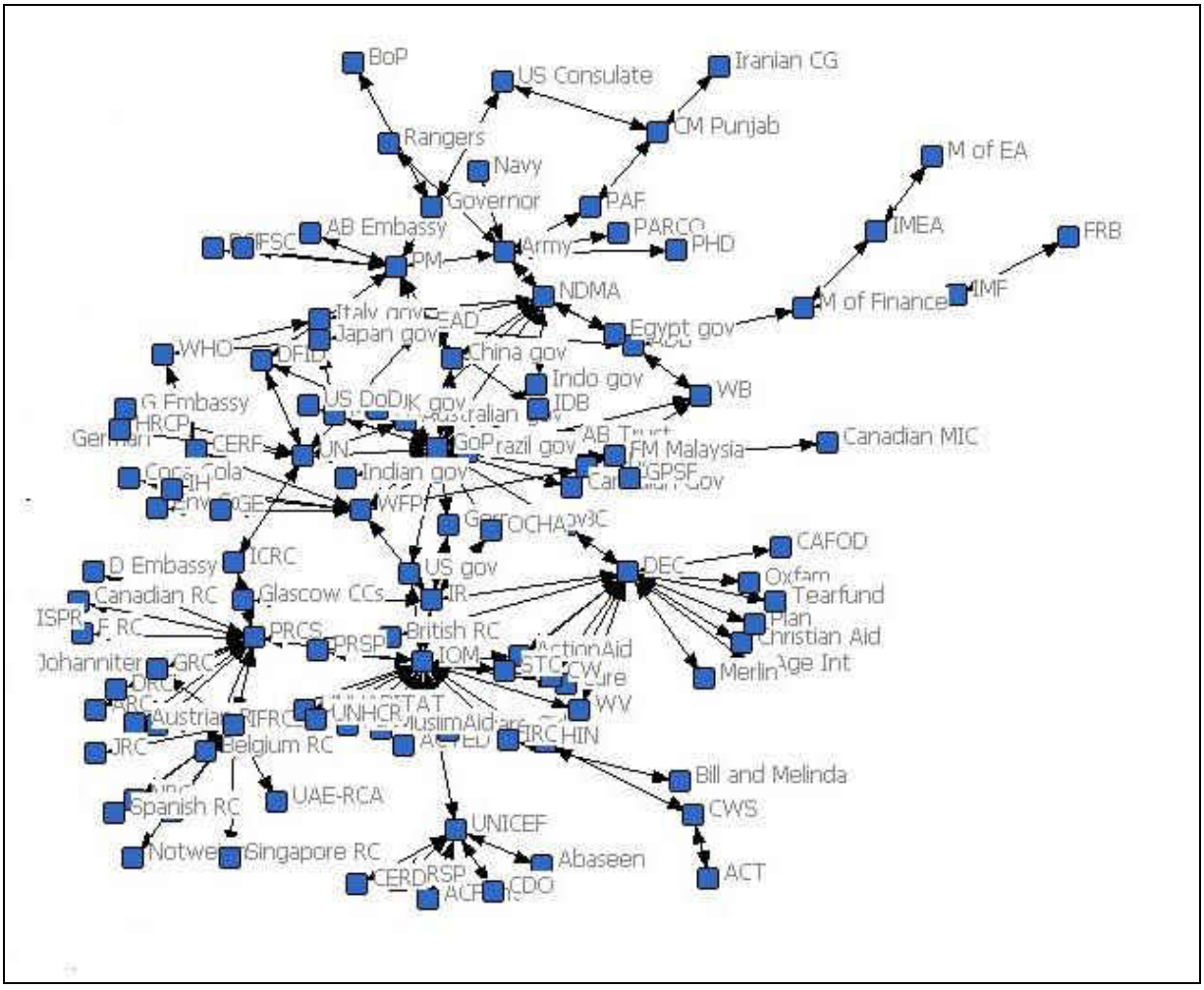

Figure 16 National-International Response Network

The sociogram in Figure 15 shows the actual national-international response system during the Floods of 2010. The sociogram above shows the connected network only and omits the isolates from the figure. If the complete network (with isolates) is viewed it is observed that there are many players isolated in the whole network. There are also a number of subgroups that are not integrated and connected to the central, main response network reflected in Figure 15.

The network centralization is very low for the actual/emergent response system - Network Centralization = 2.49%. This is mainly because the network has many isolates and dyads not connected to the main central network. Also the type of interactions and transactions at this level are very diverse and of varied nature.

5.3.2.1. Key Players and Partners in Response at the National-International Level

According to the content analysis and SNA results, it was established that the Government of Pakistan (GoP) and the NDMA played a major coordination and leadership role in the overall response system. According the NDRP of 2010 the NDMA is tasked to play a leadership and coordination role ensuring that the response is flowing smoothly and the essential partnerships are mobilized. According to the NDMA Chairman serving during the Floods:

> The nature of collaboration extended from forecasting assistance required, de-conflicting to ensure all areas were covered and there was no duplication, review daily progress, undertake strategic decisions in collaboration with all concerned stakeholders, redistributing assets if required, re-orientation of effort in accordance with the need, coordination support required from the military, allocation of aviation effort, establishment of field hospitals that were sent by friendly countries, receiving military contingents coming for assistance and deploying them in areas where needed, receipt of bilateral assistance coming thru special chartered flights and moving them to areas where needed, working out facilitation procedures like visa on arrival, tax exemptions, security arrangements, standard reporting formats, increased visibility and transparency of assistance, coordination with other relief providers from the informal sectors like

corporate world, Banks, Philanthropists, Cluster functioning - UN (OCHA, WFP, UNICEF, IOM, and WHO), Pakistan Armed Forces, PDMAs, District Coordination Officers/DCs, SUPARCO for daily satellite imageries, NADRA and few scheduled banks for Cash Distribution through Watan Cards Scheme, PMD for weather forecasts, Irrigation departments for monitoring the flood protection structures. (N. Ahmed, Personal Communication, 22 September, 2013).

Table 23 Degree Centrality Results for the National-International Response Network

	Degree	NrmDegree	Share
GoP	20.000	1.838	0.060
IOM	19.000	1.746	0.057
IFRC	15.000	1.379	0.045
DEC	15.000	1.379	0.045
PRCS	13.000	1.195	0.039
NDMA	9.000	0.827	0.027
WFP	9.000	0.827	0.027
PM	8.000	0.735	0.024
UN	7.000	0.643	0.021
Army	7.000	0.643	0.021
IR	6.000	0.551	0.018
UNICEF	6.000	0.551	0.018
ADB	4.000	0.368	0.012
French gov	4.000	0.368	0.012

The centrality measures shown in Table 23 reflect that the GoP was leading the response, closely being followed by the International Organizations of Migration (IOM) (the International organization that is responsible for leading the Shelter cluster). With such massive floods, there were many evacuations and international displacements and houses were washed away or severally damaged, thus providing shelter immediately was a major response operation. Also IFRC is the coordinating body for Red Cross and Crescent Societies and has a strong network of

chapters in different countries and within Pakistan as well. Similarly DEC is UK based and is an umbrella agency/committee that coordinates donor support from a number of charities and nonprofit agencies. This organization is also playing a central role in the response network.

Table 24 Descriptive Statistics for Centrality for the National-International Response System

DESCRIPTIVE STATISTICS

	Degree	NrmDegree	Share
Mean	2.147	0.197	0.004
Std Dev	4.018	0.369	0.007
Sum	586.000	53.860	1.000
Variance	16.147	0.136	0.000
SSQ	5666.000	47.865	0.016
MCSSQ	4408.139	37.239	0.013
Euc Norm	75.273	6.918	0.128
Minimum	0.000	0.000	0.000
Maximum	29.000	2.665	0.049
N of Obs	273.000	273.000	273.000

Network Centralization = 2.49%
Blau Heterogeneity = 1.65%.
Normalized (IQV) = 1.29%

The descriptive statistics for degree centrality depicted in Table 24 depict a highly decentralized network with the mean centrality score of 2.147 and a variance of 16.147. The high variance score reflects power imbalances within the responding agencies. There are also plenty of isolated agencies in the network that contribute to the high variance in the network.

According to the response system and plan in place NDMA is recommended to play the most central role in the response network. The organization is playing a central role. Sometimes in media coverage the role of NDMA and the GoP are substituted for each other, since NDMA is

the federal level government agency heading and coordinating the response. This has to be taken into consideration when making conclusions about the most central actors in the network. According to betweeness centrality measures the NDMA is playing a more central role compared to the DEC or IFRC. This depicts a strong coordination and brokerage role being played by the organization. This is in line with the planned response system in place since NDMA is essentially responsible for coordinating the overall response in the country and mobilizing support.

Table 25 Betweenness Centrality Results for the National-International Network

	Betweenness	nBetweenness
GoP	2851.952	7.738
IOM	2785.529	7.558
NDMA	1346.550	3.654
US gov	1288.795	3.497
PRCS	1107.252	3.004
DEC	997.119	2.705
WFP	861.017	2.336
IFRC	836.057	2.268
IR	769.100	2.087
UN	758.310	2.057
Army	752.086	2.041
PM	723.821	1.964
ADB	597.833	1.622
UNICEF	545.000	1.479
ICRC	512.019	1.389
BC	501.976	1.362
M of Finance	436.000	1.183
China gov	430.786	1.169
EAD	301.783	0.819
Governor	229.583	0.623

Clique analysis results are shown below. A total of 43 cliques were found in the overall national-international response system which reflects a high level of collaborative activity.

Table 26 Cliques identified in the National-International Response System

Cliques
1: Australian gov GoP NDMA UN
2: China gov GoP NDMA
3: GoP Indo gov NDMA
4: GoP M of Finance NDMA
5: GoP NDMA OCHA WFP
6: GoP NDMA Saudi gov
7: GoP NDMA UK gov
8: GoP NDMA US gov
9: GoP M o FA NATO
10: GoP M o FA Saudi Embassy
11: GoP M o FA Saudi gov
12: GoP M o FA UN
13: GoP M of H Saudi Embassy
14: GoP Pak Embassy US US gov
15: ADB M of Finance NDMA WB
16: Army NDMA PM
17: Army PAF PM
18: Army PHD PM
19: Army Navy PAF
20: Army NDMA Saudi gov
21: Australian RC IFRC PRCS
22: DFID PM UN
23: DRC IFRC PRCS
24: EAD PM UN
25: FRB IMF M of Finance
26: GRC IFRC PRCS
27: IFRC IOM PRCS
28: IFRC NRC PRCS
29: IFRC PRCS Spanish RC
30: IOM PRSP UNICEF
31: IR OCHA WFP
32: M of IB&N NDMA PM
33: M of SF&EA NDMA PM
34: Military NDMA US gov
35: M of Finance NBP PM
36: Oxfam PU UNICEF
37: M of Finance PBOI PM
38: M of Finance NDMA PM President
39: China gov NDMA PM
40: NDMA PM UN
41: M o FA PM UN
42: PM PRCS SNGPL
43: OCHA QC WFP

NDMA on behalf of the federal government was cooperating and coordinating the response with the humanitarian agencies under the umbrella of the UN Humanitarian Country team, working under the humanitarian coordinator who coordinated through UN OCHA. NDMA was also networking with a network of INGOs under the Pakistan Humanitarian Forum and national NGOs under the National Humanitarian Network. Additionally PRCS (ICRC and IFRC help through local chapters), Pakistan Poverty Alleviation Fund and Focus of Agha Khan Foundation were also prominent members of the federal government and NDMA. The response was also coordinated with the donor countries highlighting the areas of assistance like Food, Shelter, WASH, and Health so that they could fund the UN Agencies in accordance with the priorities of the government (N. Ahmed, Personal Communication, 22 September, 2013).

Through the Foreign Office an appeal was also made to Pakistani expatriate communities to help with certain items which were required and had a Pakistani context (For instance in the Kashmir Earthquake of 2005 NDMA had received skirts and long boots for women that had gone to waste since the affected population required traditional dresses). Non-traditional donors like the Gulf / Middle-eastern countries along with traditional donor countries such as China, Turkey, which normally help with in-kind donations directly to the government, were also approached and they helped substantially. Within the government, it was the Army, PMD, Flood Forecasting Division, SUPARCO, Utility Stores Corporation, Line Ministries like Communications, Energy, Health (through National Health Emergency Prepared Response Network - NHEPRN) with which the NDMA coordinated the response (N. Ahmed, Personal Communication, 22 September, 2013).

5.4 Findings and Discussions

A main reason for breaking the overall response system into multi-level response systems was to determine what functions and response activities are taking place at each level of response. Through the theoretical framework, it was identified that different levels are playing different roles in the disaster response. Thus, it is important to identify networks according to individual response functions. Through a thorough content analysis the response function for each transaction was also identified. At the national and international level, many transactions and interactions concerned the provision of funds and donations. These interactions were identified under the 'Funds/Donations' response function. This is a response function that was not formally identified in the UN cluster approach led response plan, and nor was it identified in the salient response features in NDMA's 2010 response plan. However, through judgment and through a literature review on the role of humanitarian agencies and multi-lateral agencies, it was identified as a major immediate response function. Additional functions such as the provision of 'Food, NFIs, Shelter' rely on the 'Funds/Donations' response function and are really not possible unless a certain amount of aid or funds flow in the country either directly or through well-reputed and well- recognized multi-lateral agencies like the UN agencies.

There are many factors that influence the flow of international aid and donations within the country. Previous research has identified the following factors that influence the amount, timely provision, and flow of aid in the impacted country: severity of the disaster, the income of the impacted country (the lower the income the more the aid flow), news coverage, proximity of the impacted country to the country providing aid (Strömberg, 2007). Drury, Olson, and Belle

(2005) suggest that the flow of US aid in disasters depends dominantly on foreign policy and is really not a nonpolitical or objective decision. Pakistan, being a major ally in the US 'War on Terrorism' warrants itself as being a major recipient of aid.

Through SNA the key players in the funding network are identified and through a content analysis the motivations and reasons for the flow/or lack of flow of funds were also determined. A major reason why funds flow in the first place following a catastrophic disaster, such as the Pakistan Floods, is because a formal appeal has been made by the disaster inflicted country, or through multilateral agencies such as the UN agencies.

Through a content analysis the major appeals were identified throughout the analysis period (from July 22, 2010, to August19, 2010). The Table 27 shows these appeals. Apart from international and national appeals for funds and donations, the National-International response system is involved in a lot of information sharing activities. Information is usually shared via different media outlets (newspapers, televised appeals and through the radio). Many of these information sharing sessions are isolated events and do not involve multiple players coordinating and collaborating. This is one reason why the National-International response network has so many isolates. Moreover, the response function termed 'Assessments' is an important response function at the National-International level. In this analysis we use assessments for a range of activities such as damage and needs assessments, situation analysis reports and information exchanges on the situation. Thus, the most common response activities at the national-international level are provision and management of funds and donations, launching international and national appeals, and also situation, damage and needs assessments along with regular

information sharing at meetings and press conferences. Apart from these main activities there are many interactions and transaction that concern in-kind donations and aid from foreign countries and INGOs. The in-kind aid includes both food and non-food items such as tents for shelter.

Table 27 Major Appeals by National and International Agencies/Leaders

Prime Minister of Pakistan (August 6, 2010)	Appeals for immediate international assistance through a televised address. Identified the floods as the 'worst floods' in the history of the country. (*Daily Times*, August 07, 2010).
Prime Minister of Pakistan (August 14, 2010) (Independence Day for the country)	"I appeal to the world community to extend a helping hand," he said. (*New York Times*, August 14, 2010)
British Charities (August 5, 2010)	Launched an appeal to raise funds for the country (*Daily Times*, August 6, 2010).
Disasters Emergency Committee (August 5, 2010)	Broadcasting appeals for donations on a number of TV channels and radio channels. (*Daily Times*, August 6, 2010)
US Government (August 18, 2010)	US secretary of state Hillary Clinton appealed to the American public to donate generously to a newly established "Pakistan relief fund". (*The Guardian*, August 19, 2010).
Gordon Brown , Former British Prime Minister (August 10, 2010)	Appeals to the British public to increase their efforts since international response has been slow compared to previous disasters. (*The Guardian*, August 11, 2010).
UN Secretary General Ban Ki-moon (August 15, 2010)	Appealed to foreign donors to increase their donations and aid efforts to support the suffering people of the country. (*New York Times*, August 15, 2010).
Regional Director of the United Nations Children's Fund (UNICEF) Daniel Toole (August 17, 2010)	Appealed to the international community to generously donate. He was reported to have declared this "the biggest emergency on planet earth to this day" (*The News*, August 18, 2010)

At the provincial level most response activities are taking place. At the provincial level distribution and management of aid seems to be the most important activity. The provincial capital of Punjab, the city of Lahore has the most transactions concerned with setting up and managing relief camps. Moreover, many interactions at the provincial level also show the flow of funds to CM's Relief Fund. Also many interactions involve some type of information sharing activity involving a situation analysis and reporting on the needs and damages in regions of Punjab. The results of the clique analysis show that Multi-lateral agencies (MLAs) are playing a collaborative role in the network with OCHA coordinating with both the PDMA and NDMA, and also with other UN agencies such as the WFP. The CM doesn't seem to be involved collaboratively with MLAs but is more involved with government agencies. To get more insights on the provincial level collaborative activity from a multilateral agencies' perspective, a representative from WFP working in the Punjab region was interviewed.

> WFP worked with implementing partners (INGOs and NGOs), government line departments, the Army and other UN agencies. Remember that the cluster system was also activated so the UN agencies and other development partners were coordinating and sharing information pretty regularly – in the initial first few weeks we were meeting every day. The government (Relief Commissioner Mr. Iftikhar Rao) was officially spearheading the response. The Army's 2nd Corp was also very active and we coordinated with them at the same frequency as we did with the government. (WFP Representative, Personal Communication, 23 September, 2013).

At the local level, the results of the analysis show that very little collaborative activity was taking place. There were no cliques identified in both the districts studied which is a rather surprising finding. Moreover, in the district of Muzzafargarh the predominant response activity was related to providing medical relief and facilities to the affected population and the most central role was being played by the Punjab Department of Health. In DG Khan district, the CM and the DCO were playing a central role. Moreover, the Army was also playing a major role in the relief efforts as was identified through the content analysis. Many areas needed to be evacuated, thus the predominant response activity in DG Khan seemed to be evacuations, transportation, and provision of shelter and food. It can be concluded that contextual factors influence the nature of response and collaborative activity at the district level.

5.5 Hypotheses and Results

The nature of the study does not allow hypothesized relationships to be tested the way they are tested in traditional research using statistical tools and analysis. The utilization of SNA allows understanding the process along with exploring and describing the response networks and factors that influence the structure and working of the systems.

Table 28 below provides the summary of the study hypotheses and the overall results. Results show that the network structure, leadership, and institutional support highly influence the collaborative response in disasters. The networking capacity and the organizational resource dependencies also reflect an influential role on the collaborative response but additional research is required to support H2 and H5 fully.

Table 28 Summary of Hypotheses and Results

	Hypotheses	Results
H1	Network structure influences overall effectiveness of response networks.	Supported
H2	Networking capacity of organizations positively impacts collaborative response effectiveness	Somewhat Supported
H3	Leadership support positively impacts collaborative response effectiveness.	Supported
H4	Institutional support positively impacts collaborative response effectiveness	Supported
H5	Organizational resource dependencies positively impact collaborative response effectiveness.	Somewhat Supported

Hypothesis 1: *Network structure influences overall effectiveness of response networks.*

Dense relationships can achieve goals in a better way in a local network where contextual knowledge determines the types of response functions and players that have to be activated. For example in the DG Khan network, evacuation of people was a critical function and most transactions involve that function. Thus, dense relationships around the specific function will help to mobilize the desired response. The district level plans at the moment depict a highly centralized network which might function well if the capacity for running a DDMA is in place. Features of networks such as strong hubs, brokers within the network, multiplexity of relationships all reflect a strong network structure and are missing at the local level of analysis. Also no cliques at the local level reflect an ineffective collaborative response. Thus, network structure is influencing the collaborative response at the district level. The network structure changes with the level at which response is observed and studied, and so does the collaborative

response. So this hypothesis is supported through the visual depiction of networks, the centralization and decentralization scores, and the level of clique activity at the three levels of analysis.

Hypothesis 2: *Networking capacity of organizations positively impacts collaborative response effectiveness.*

Throughout the SNA results and the analysis of semi-structured interviewed this was identified as an important variable that supports collaborative response. The former NDMA Chief identified the usual partners it has worked in the past and comfortably works with across many disasters. Thus, trust and existing relationships improve coordination and collaboration in a response.

During interviews it was discussed that NDMA meets regularly with all the donor countries, UN Agencies and PDMAs. They hold pre-monsoon conferences as a regular feature to keep all agencies updated. Contingency planning is a regular feature. Additionally conferences and seminars are held with representation from all concerned. Additionally the Armed Forces also hold a regular pre-monsoon conference to review the preparations of all the three services in which NDMA is represented at the leadership level. All the activities that fall in the pre-disaster phase are planned in close coordination with the stakeholders where in there is joint planning by NDMA and UN agencies/donors for undertaking certain activities like risk mapping, establishing Emergency Warning systems, undertaking disaster risk mitigation efforts. At the national level, there seem to be both relational and programmatic networking capacity.

At the provincial level, a WFP representative explained what type of partnerships and trust-building activities played out in the response to 2010 Floods:

> WFP is part of the humanitarian cluster system so partnerships are formed through the inter-agency structure. For instance since 2009 in the conflict/post conflict scenario: the army evacuates IDP's, the government directs and coordinates the effort, UNHCR undertakes registration and WFP does household food distributions. In 2010 no one had time to prepare and we simply launched operations. We developed informal partnerships wherever we could but the emphasis was on scaling up the operation and saving lives. (WFP representative, Personal Communication, September 22, 2013)

Thus, it can be concluded that relational networking capacities that are built prior to a disaster very well play out during response. However, the scale and nature of the disaster and the urgency of the situation also help to create new partnership during response. Thus, it is programmatic capacity such as interoperability between agencies in response that seems to be more important than relational network capacity in the context of large-scale disasters such as the floods. Also the data collection method provides stronger data on programmatic capacity and less of relational network capacity. Relational network capacity reflects pre-existing ties and previous interactions between agencies that develops trust and social capital between responding agencies. This information can be supported through more interviews of responding agencies and thus the hypothesis is not fully supported.

Hypothesis 3: *Leadership support positively impacts collaborative response effectiveness.*

This hypothesis is supported through all the three levels of response systems studied in the case. Leadership takes the form of political, managerial, and organizational leadership. Through a content analysis and the various SNA measures applied in the research, it is clear that network systems with clear leadership and the ability of these leaders to engage other players within the network through playing important brokerage and coordination roles influences the collaborative nature of response. The lack of clear leadership at the district levels and high centrality scores of players at the national-international level correlates with the type of clique activity and overall collaborative response of the networks. Results show that more powerful players in the network also enjoy clique overlap and are involved in collaborative activities. Missing leadership at the district level is a clear indication of a weaker and scattered response. Also organizational leadership of the UN agencies through the cluster approach and the strong leadership of PRCS with its international partners reflect strong functional sub-networks within the overall response system.

Hypothesis 4: *Institutional support positively impacts collaborative response effectiveness.*

Institutional support was available in the form of disaster management plans but those documents were never really utilized and subsequently, the SOPs were not activated. Through the interviews it was established that these plans were developed but never implemented in the 2010 Floods. Some respondents suggest that there was not enough time to go through plans and follow procedures. The task was to scale up relief efforts and build partnerships as seemed appropriate according to situation (WFP representative, Personal Communication, September 22, 2013). However, during the response phase the government of Pakistan formally requested the

United Nations to launch a response plan and around the second week of August an Initial Response Plan was developed by the UN detailing the relevant clusters (Food, Shelter and NFIs, Water and Sanitation, Health, etc.). The inter-agency UN system is an institutional set-up that is required to improve coordination between different NGOs, INGOs and relevant government ministries. Thus, the launching of this plan and the launching of clusters during response help to improve collaborative response. Many cliques identified in the study show lead members of the various clusters such as WHO, WFP, OCHA, and IOM playing central roles in the networks and also enjoying clique overlap with each other that shows highly collaborative activity. Thus, institutional support positively impacted the collaborative response in the 2010 Floods.

Through the literature and through the ICA theoretical framework it has been established that the type and nature of institutional rules and policies can either facilitate response or make the mobilization of effective relief and response more cumbersome and problematic. ICA theory identified transaction costs in partnerships and agreements to play an important role in determining the outcomes of collaborative activity. Thus, institutional support can take the form of formal plans and policies in place, the creation and effective management of appropriate funds for quick mobilization of relief goods and services, arrangements such as relaxing visa requirements for international relief teams all fall under the type of institutional support available. Moreover, this research shows that institutional support was available in the form of Relief Funds that were launched either through international appeals by INGOs, Charities, and UN agencies and also by the political and government leadership within the country to facilitate disaster response and relief.

Hypothesis 5: *Organizational resource dependencies positively impact collaborative response effectiveness.*

In terms of resource dependencies and resource exchanges, disaster response networks comprise of organizations from different sectors and levels of the government that rely on each other when faced with capacity constraints. From a vertical response perspective, local governments rely on the state government when they are unable to cope with disaster response and relief. While, state level/provincial organizations rely on national and international sources of help when their capacity to respond is limited. At the horizontal level, a multitude of organizations from different sectors collaborate and pool resources to provide effective relief to disaster victims. Through content analysis, each interaction and transaction involving response agencies were also coded according to response functions. Networks pertaining to specific response functions such as Shelter, Food, WASH, and Health need to be developed in order to explore and study this hypothesized relationship fully. Currently, the results definitely show an influence of resource dependencies; however, more analysis may be required to fully support this hypothesis.

This chapter has analyzed the results of the content analysis, document analysis, and SNA. Various SNA measures have been utilized to explore the hypothesized relationships. The next chapter addresses the specific research questions of this study and provides a brief discussion on the implications of this research.

CHAPTER SIX: CONCLUSIONS

This final chapter highlights the findings of the research and addresses the research questions through the results of the analysis carried out in the previous chapter. The second part of the chapter discusses the implications of this research. The concluding part of the chapter identifies some limitations of the research and discusses the possible future directions of research.

6.1 Research Findings

6.1.1 Factors Facilitating and Hindering Collaborative Response

The first research question of the study is: What factors facilitate and impede interorganizational collaborative response to catastrophic disasters at the local, provincial, national, and international levels?

The overall goal of the study was to be able to identify factors that contribute positively to collaborative response. Along with facilitating factors, it is important to identify factors that may hinder response so that these factors can be avoided. The content analysis of various sources along with some semi-structured interviews provided a list of some factors that either facilitate response or hinder it. Previous research has suggested that coordination and collaboration between different responding agencies is challenging in emergency and crises situations (McEntire, 2002). Crises situations are made complicated due to pressures on responders to react quickly and effectively, usually with limited means and capacities. Thus, a detailed study of what

factors hinder and facilitate response in a polycentric structure of responding agencies is important to advance and improve emergency management practice in developing countries suffering from both natural and man-made disasters, such as Pakistan.

Some of the factors identified as facilitating factors by respondents were: coordination mechanisms such as the interagency platform by the UN (clusters activation); coordination bodies at every level such as the NDMA and PDMAs; preplanning and preparedness activities such as stock prepositioning; local capacity to evacuate; availability of funds; government contingency planning; geographical positioning and expertise of the Pakistan Armed Forces; philanthropic spirit of citizens and Pakistani Diaspora living abroad; and good relationships with donors and international agencies.

Some of the factors identified as facilitating factors at the National-International level through SNA results and content analysis were: the launching of international and national appeals, formal requests for activating response, prior working and friendly relationships between countries, the strategic importance of the country from a foreign policy perspective, and the activation of the UN inter-agency cluster approach.

Some of the factors identified as facilitators of response at the provincial level were: the activation of a provincial level relief fund, and strong leadership support from the Chief Minister of Punjab. Other factors identified as facilitators at the local/district level were: the strategic positioning of the Armed Forces, and the expertise of the Armed forces in engineering and medical relief services along with search and rescue and evacuations.

Some of the factors identified as hindering factors by respondents were: lack of coordination mechanisms, lack of preparedness and planning activities, weak capacity of local governments to provide funds available or carryout essential response and relief activities, capacity/delivery differential between provinces, nonfunctional DDMAs in many districts, absence of detailed hazard and risk maps, and comprehensive community-based disaster risk reduction measures.

The factors identified as hindering factors at the national-international level through content analysis of documents and reports along with SNA results have been identified as: the nature of the disasters (the slow onset of floods), the lack of appropriate and timely warnings, and external events such as the Airblue Flight 202 mysterious air crash tragedy that took place on the July 28, 2010. Due to this tragic event, all the attention was diverted away from the quickly approaching floods and response became slower than it should have.

The factors identified as hindering factors at the provincial level through content analysis of documents and reports along with SNA results have been identified as: lack of an operational PDMA at the onset of the disaster, and the different political affiliations of the Chief Minister of Punjab and the Governor of Punjab.

The factors identified at the local/district level through content analysis of documents and reports along with SNA results have been identified as: lack of operational DDMAs or a weak role of the district government in coordinating and collaborating the overall response; a lack of contingency planning at the local levels; a reactive approach to managing disasters; and a lack of

partnerships between local government and international NGOs, such as PRCS, and local NGOs such as the Edhi Foundation.

6.1.2 Differences and Similarities in Multi-Response Systems

The second research question of the study is: What are the differences and similarities in the multi-level response systems? What response functions/operations are important at different levels of interactions?

All the planned networks in the 2010 National Disaster Response Plan were structured as highly centralized networks with the NDMA, PDMA, and DDMA as the most central and coordinating bodies at their respective levels of response. However, in reality this was not the situation. Perhaps a small emergency can warrant such coordinated and centralized structures, but the scale of the 2010 floods was unprecedented. Through interviews, almost all respondents suggested that no plan, not even the most sophisticated of them, could have sufficed for the 2010 Floods. It was a disaster beyond the scope of any governments' scope or imagination for that matter. All the actual response networks were fairly decentralized with the most decentralized network at the national-international level. A major reason for decentralization is because there are many isolates operating at the national-international and provincial level of response. Also none of the networks were highly dense. All networks had isolates, dyads, and triads that were not connected to the overall central response network.

Moreover, district level response networks were focused on one or two key response functions such as medical response and evacuations and provision of transportation and shelter. At the provincial level the provision of relief goods and the management of relief camps was a

major response function along with information sharing and situation analysis. At the national-international level the response network was preoccupied with managing the flow of funds and donations along with making appeals for donor and aid support. Moreover, another major response function at the national-international level concerned information sharing, situation analysis, and damage and needs assessments. This is a very important finding of this research as in future plans these varied response activities and functions at different levels should be taken into account.

6.1.3 Leadership Support in Response Systems

The third research question of the study is: How does leadership support in response systems impact interorganizational collaborative response to disasters?

Leadership has been observed in the response networks through centrality measures such as degree centrality, closeness centrality, and betweenness centrality. At the national-international level the leaders, coordinators and facilitators of response, the most powerful and resourceful players are: Government of Pakistan and IOM (lead the shelter health cluster), NDMA, IFRC, and DEC. At the provincial level the leaders are: the Chief Minister of Punjab, the PRCS, and the Health Department of Punjab. At the local levels: the DCO DG Khan and CM Punjab are identified in the DG Khan and the Punjab Health Department is the most central organization in the Muzzafargarh district. It is interesting to observe that these leaders are highly active in the cliques identified at the national-international level and the provincial level. No cliques were identified at the local levels. Also due to the scattered and small nature of the local

disaster response networks, the variance in centrality scores is low reflecting that the most central players may not be the most powerful players.

Other dimensions of leadership support can be in the form of flash appeals and the press conferences leaders participate in to ensure that relief activities pick up the pace. However, to gauge the impact of these appeals on collaborative activity, it is important to observe the structure of the network before and after the appeal to see if these specific leadership-backed appeals help to pick up response. This will be taken up as a future research project.

6.1.4 Institutional Support in Response Systems

The fourth research question of the study is: How does institutional support (in the form of formal and informal structures such as plans, development of institutionally backed relief funds, and international appeals for response) facilitate collaborative response in disasters?

Institutional support was available in the form of disaster management plans but those documents were never really utilized and the standard operating procedures were not activated. Through the interviews it was established that these plans were developed but never implemented in the 2010 Floods. Some respondents suggested that there was not enough time to go through plans and follow procedures. The task was to scale up relief efforts and build partnerships as seemed appropriate according to situation (WFP representative, Personal Communication, September 22, 2013). However, during the response phase, the government of Pakistan formally requested the UN launch a response plan. Around the second week of August, an Initial Response Plan was developed by the UN detailing the relevant clusters (Food, Shelter and NFIs, Water and Sanitation, and Health). The inter-agency UN system is an institutional set-

up that is required to improve coordination between different NGOs, INGOs, and relevant government ministries. Thus, the launching of this plan and the launching of clusters during response help to improve collaborative response. Many cliques identified in the study show lead members of the various clusters, such as WHO, WFP, OCHA, and IOM playing central roles in the networks and also enjoying clique overlap with each other that shows highly collaborative activity. Thus, institutional support positively impacted the collaborative response in the 2010 Floods.

6.1.5 Network Capacity of Responding Agencies in Response Systems

The fifth research question of the study is: How does the network capacity of different organizations responding in disasters influence and impact collaborative response?

Two types of network capacities are relevant in this study: Programmatic capacity (the ability to network with each other due to common program goals and interoperable systems that make exchange easy), and relational network capacity (the capacity formed through trust-building and relationship building activities and joint planning and preparedness activities). Results of clique analysis showed that organizations that had worked prior to the 2010 Floods in other disasters (NDMA had worked with WHO, WFP, and OCHA), and organizations that shared same humanitarian goals, such as WFP, WHO, and OCHA, were also in same cliques.

Moreover, during interviews it was also identified that NDMA meets regularly with all the donor countries, UN Agencies and PDMAs. They hold pre-monsoon conferences as a regular feature to keep all agencies updated. Thus, at the national-international level, network capacity is influencing the collaborative response. At the local level, network capacity seems to be weak at

the moment. Thus, further investment in developing these network capacities of key players will improve local, district level response.

6.1.6 Organizational Resource Dependencies in Response Systems

The sixth research question of the study is: How does the level and nature of resource dependencies between different organizations influence collaborative response in disasters?

Results from SNA analysis show that collaborative activity is taking place around common response functions. For example, at the district level Punjab Health Department (PHD) has links with a number of different hospitals and other agencies providing medical relief to victims and the affected populations. However, organizational resource dependencies explain transactions and interactions between two agencies; there is not enough evidence to suggest that the resource dependencies actually lead to collaborative response. One way to collect more evidence is to study the cliques and the interactions between the various members of the cliques and identify whether strong resource dependencies exist or not.

6.1.7 Network Structure and Response Systems

The last research question of the study is: Which structural configurations in networks hinder or/and facilitate collaborative response in disasters? Is decentralization superior compared to a centralized structure of the response system?

The structure and nature of response networks might vary at different levels of analysis. A local response network will be smaller in size and more focused on ground activities, (i.e. relief and rescue operations, evacuations, and provision of health), compared to the national-

international response system that will be occupied with getting donor support, managing the flow of aid, and coordinating overall response functions. It is important to identify which response functions are important and each level so that resources can be mobilized effectively and capacity can be built accordingly as well.

This is a question that has been explored in variously studies before (Drabek, 1985; Milward & Provan, 1995). There has been an attempt made to study the structural configurations that lead to better network performance and outcomes. The argument for a more centralized structure is to ensure goals are met in the network, while the other side of the argument suggests that flexibility and decentralization helps to adapt to changing needs and situations during disasters (Kendra & Wachtendorf, 2003; Mendonca & Fiedrich, 2004).Thus, it is difficult to conclude whether decentralization is better than a centralized response network.

Dense relationships can achieve goals in a better way in a local network where contextual knowledge determines the types of response functions and players that have to be activated. For example in the DG Khan network, evacuation of people was a critical function and most transactions involve that function. Thus, dense relationships around the specific function will help to mobilize the desired response. The district level plans at the moment depict a highly centralized network which might function well if the capacity for running a DDMA is in place. Features of networks such as strong hubs, brokers within the network, and multiplexity of relationships, all reflect a strong network structure and are missing at the local/district response networks. Also no cliques at the local level reflect an ineffective collaborative response. Thus, network structure is influencing the collaborative response at the district level. The network

structure changes with the level at which response is studied, and so does the collaborative response. Therefore, research question is addressed through the various SNA measures utilized in this study.

6.2 Implications of the Study

6.2.1 Theoretical Implications

This study is important to advance network theory perspectives in the field of disaster management and collaborative public management. It is also important to understand that large-scale unprecedented disasters cannot be studied through the same lens as routine emergencies or small localized disasters. Also the subject of complex disasters cannot be studied through a single theory due to the complex nature of management and interactions between agencies. The utilization of Social Capital Theory, ICA framework, and Resource Dependency Theory are all relevant for understanding and exploring the disaster response context. Each theory was used to build few prepositions that further helped to develop the study hypotheses. All these theories are relevant in studying collaboration. Also the development of the conceptual framework reflects that there exist some overlaps in these theories. The discussion on weak ties and strong ties is addressed in collective action theories, as well as the Social Capital Theory. Moreover, the comprehensive conceptual framework developed in this study will help to guide not only scholars but also practitioners to understand the different dimensions and predictors of an effective collaborative response. Currently this study remains to be descriptive and exploratory. In the future better conceptualizations and operationalizations will help to conduct some formal hypothesis testing.

This study proposes that large-scale disasters need to be studied from a multi-layered and multi-level governance perspective since not all layers and levels of response are the same in terms of the network structure or the focal response functions. The results have clearly identified the unique dynamics of exchange and interactions taking place at each level of response. This approach has been applied in policy creation and governance issues, and needs to be explored more in mainstream disaster management research. The approach adopted in this research breaks down a complex system into different levels and components so that these components are better understood and in turn improved. This is a theoretical approach that can easily be applied to catastrophic disasters across the globe.

6.2.2 Methodological Implications

Content analysis and document analysis is a well-established and thorough way of collecting data for past events. A rich pool of information was found through different newspapers and situation reports. However, going through the various sources meticulously is a difficult process. However, this was the best way to collect data since Pakistan has suffered floods every summer after 2010. If a snowball method was used for developing the response network, then the results might not be very because a recall to three years earlier is difficult for agencies that are responding in the floods every year. This study identified content analysis of reports and newspapers are a viable method to utilize in similar studies. Moreover, triangulation was achieved in this research by including semi-structured interviews of representatives of key agencies that are identified through SNA results. This not only brings supportive qualitative

information to the quantitative analysis via SNA but strengthens the single case study design of this research.

However, methodologically a major shortcoming and concern was experienced when developing the district level response network. National level newspapers did not contain very detailed information of districts. Thus, it is important to identify local/district level newspapers and re-develop the district level response networks to ensure that a complete network response system is identified and analyzed. Moreover, future research will also involve more semi-structured interviews of players identified as central nodes and periphery nodes in disaster response networks to get a complete picture of the factors that may be hindering and effective disaster response.

6.2.3 Policy Implications and Recommendations

This research has several policy implications and policy recommendations. Since this study analyzed the planned and actual response networks and structure, it is important to address gaps in the current plan. There are several cliques and collaborative activities taking place in actual networks that are not identified in the actual plans. Since plans are evolving documents, the NDMA needs to update its current plan to include the collaborations and partnerships identified in this analysis.

Moreover, the discrepancies in the plans and the actual response show that DDMAs are required to head response and relief at the local level. This has not been put into practice. Although an NDMA Act was passed in 2007 requiring all districts to establish DDMA, the districts have not taken this task seriously. More recently the country has been engaged in

monsoon contingency planning which is a step in the right direction. However, the fact that DDMAs are required to be headed by DCOs, or senior officials of the district government and tehsils has to be altered. Through interviews and through the planned networks, DDMAs are required to activate the DEOC to coordinate and manage district level disasters. Just like there are a number of district level offices headed for Directors, the DDMA needs to have a separate Director who is tasked to coordinate response during the disaster but also engaged in contingency planning, awareness drives, and training and capacity building of local communities. This will help to develop the capacity that is missing at the local level at the moment. Previous research has suggested that coordination and collaboration between different responding agencies is challenging in emergency and crises situations (McEntire, 2002). Crises situations are made complicated due to pressures on responders to react quickly and effectively, usually with limited means and capacities. Thus, a detailed study of what factors hinder and facilitate response in a polycentric structure of responding agencies is important to advance and improve emergency management practice in developing countries suffering from both natural and man-made disasters, such as Pakistan.

This study has also identified the response functions that are most important at each level. This will help to identify which players and resources should be mobilized at each level of response. This will help with planning and identifying SOPs again. The structure and nature of response networks might vary at different levels of analysis. A local response network will be smaller in size and will be more focused on ground activities such as relief and rescue operations, evacuations, provision of health, compared to the national-international response system that will be occupied with getting donor support and managing the flow of aid and

coordinating overall response functions. It is important to identify which response functions are important and each level so that resources can be mobilized effectively and capacity can be built accordingly as well.

6.3 Limitations

This section of the chapter identifies some of the weaknesses and limitations of this research. First of all, content analysis helped to identify the interactions and transactions that took place during the first few weeks. Although an attempt was made to use multiple sources of information to reduce bias, there might be some data missing. The response networks at the local level are sparse. Thus, more information from local newspapers will identify the complete network at the local response. Apart from content analysis, more interviews need to be conducted at the district level to get contextual information and understand district disaster management in a better way. Another main concern that comes with a case study methodology is the rich contextual information in the case. Thus, with the high contextual information, external validity in the country case is weak.

6.4 Future Research

Future research will focus on expanding the case study to include the response in all provinces in Pakistan to gauge the differences and commonalities. This research focused on studying 2 of the 7 most adversely impacted districts in Punjab. Future research will focus on all 8 districts and will utilize local newspapers and reports to formulate local disaster response networks. More interviews will also be conducted to include contextual information and compare the local level response at different districts.

Another direction for future research is to compare the 2010 Floods with other, similar disasters both within the country and outside the country. Within the country, other cases of Floods of 2011, 2012, and 2013 will be compared with the 2010 Floods to see how the disaster management system has learned and improved over the passage of time. This is a potential case for studying policy learning, policy change, and institutional change. The changes in policies and their level of effectiveness over the years will be reflected through the disaster response networks in the floods of 2011, 2012, and 2013.

As part of future research sub-networks will be developed according to the various response functions identified in the study. These sub-networks will help to develop better function based response plans so that agencies have been assigned certain roles and responsibilities during routine and catastrophic disasters. Moreover, this will help to improve the implementation of the existing cluster approach and build the capacity of the government as well. Alongside research will be expanded to study man-made disasters in the country and study the viability of an all-hazards approach to managing disasters.

APPENDIX A: A TIMELINE OF EVENTS IN THE 2010 PAKISTAN FLOODS

22 July 2010: Dozens of people are killed and tens of thousands displaced following heavy rains across Balochistan, Punjab and Khyber Pahktunkhwa.

29 July: Flash floods and landslides devastate large parts of Khyber Pakthunkhwa, smaller areas of the Federally Administered Tribal Area, Gilgit Baltistan and Pakistan-Administered Kashmir. According to the Government, more than 800 people died and millions may be affected.

6 August: Pakistan declares a red alert as floods reach southern provinces. Hundreds of thousands of people are evacuated.

7 August: Landslides and flash floods are reported in Gilgit-Baltistan and other parts of northern Pakistan. Floods move into Sindh and Balochistan.

11 August: The Pakistan Initial Floods Emergency Response Plan requests $459 million for relief assistance for an initial three months.

15 August: United Nations Secretary-General Ban Ki-moon visits flood-affected areas.

25 August: More than 800,000 people are cut off by floods. The United Nations requests more support for helicopter missions.

26 August: A breach develops on the eastern bank of the Indus River in Thatta district. Thatta city is officially evacuated as the Indus breaches its western bank in the south.

30 August: At least 1 million people are reportedly on the move in Sindh as villages are submerged.

7 September: United Nations Emergency Relief Coordinator Valerie Amos arrives in Pakistan for a three-day mission.

13 September: Manchar Lake overflows, flooding new areas in Sindh's Jamshoro district.

17 September: A revised Floods Emergency Response Plan requests $2 billion for relief and early recovery needs for 12 months.

Source: OCHA (September 17, 2010).

APPENDIX B DISTRICT LEVEL SOPs FOR RESPONSE PHASE

1. District Disaster Management Authority (DDMA)

(1) Activate DEOC.

(2) Warn all district level departments to get ready for emergency response.

(3) Inform PEOC and NEOC about the situation.

(4) Organize evacuation on priority basis.

(5) Conduct initial and subsequent assessment of disaster affected areas and determine the extent of loss and damage.

(6) Prepare detailed plan for the resources requirement for relief operation and share it with the PMDA and NDMA.

(7) Provide food, drinking water, medical supplies, non-food items to the affected population.

(8) Deploy medical, search and rescue and emergency response team immediately.

(9) Set up relief camps and provide relief in the camps.

(10) Coordinate with PDMA and NDMA to deploy resources for emergency response.

(11) Liaise with I/NGOs, UN bodies and philanthropist organizations for resource mobilizations for response.

(12) Develop complaint mechanism system and set up complaint mechanism cell in the DEOC and sub district level.

(13) Hold regular media and public information briefings.

(14) Arrange detailed assessment for the early recovery programme and prepare proposal and submit to PDMA and NDMA.

(15) Forward Situation Report (SITREP) on daily and weekly basis to the PDMA, NDMA and Armed Forces etc.

2. Tehsil Municipal Administration (TMA)

(1) Keep sirens operational for early warning. Issue warning through mosques, community centre, TV cable network, local newspapers and other available means of communication.

(2) Arrange evacuation of affected population through proper transportation and house affectees in relief camps. Maintain and supervise the management of relief camps. Make separate arrangements for women in the camps according to cultural norms.

(3) Deliver food and non food items to the affected population (in camps, host locations and in the affected villages where population is still living).

(4) Provide all basic facilities in the camps e.g. electricity, health services, water and sanitation etc.

(5) Ensure security to the affected population in the villages and relief camps. Assist health department in transportation of injured and disposal of dead bodies.

(6) Brief media about the situation.

3. Health Department

(1) Designate a representative to the DEOC.

(2) Conduct a rapid health assessment and assessment of damage to health infra structure facilities. Mobilize all available health resources for emergency response.

(3) Provide first aid to the injured people and arrange evacuation to the hospital for further assistance. Setup medical camps. Deploy medical teams in mobile and static clinics and monitor it.

(4) Facilitate CBOs/NGOs, INGOs and philanthropist organizations involved in health services. Exercise vigilance for epidemic outbreak and remain prepared to deal with any disease.

(5) Coordinate with PHED for safe drinking water and sanitation facilities in relief camps. Draw up plan for early recovery of health infrastructure and submit to the provincial health department for funding.

(6) Document lessons learnt from response experiences. Disseminate to all stakeholders including provincial, health department and DDMA. Incorporate same in future planning.

4. Public Health Engineering Department (PHED)

(1) Designate a representative to the DEOC.

(2) Arrange assessment of water and sanitation schemes damaged by the disaster and prepare plan for fast track rehabilitation.

(3) Set up community water supply system in relief camps with water treatment system.

(4) Provide safe drinking water according to the Sphere Project Minimum Standards to the affected population.

(5) Deploy teams to set up temporary new water supply system for affected population.

(6) Conduct water quality testing on regular basis to ensure the minimum standards of the quality of water.

(7) Ensure that sanitation system is functioning in relief camps and make proper arrangements for drainage in the camps/temporary emergency shelters.

(8) Facilitate local and INGOs working on the water and sanitation in emergency.

(9) Exercise vigilance about any disease outbreak disease because of water and sanitary conditions and remain prepared to deal with any epidemic.

(10) Prepare a detailed report and disseminate it widely. Document lesson learnt from the response experiences and incorporate same in future planning.

5. Education Department

(1) Designate a representative to the DEOC.

(2) Conduct assessment of the school conditions. Prepare plans for fast track rehabilitation.

(3) Deploy volunteer teachers and students to assist DDMA in emergency response.

(4) Organize volunteer teachers and students to assist in distribution of relief goods in the local areas.

(5) Continue education of children using mobile/tent schools.

6. Agriculture Department

(1) Designate a representative to the DEOC.

(2) Conduct initial rapid assessment to assess damage to the agriculture crops.

(3) Render agriculture machinery to farmers for protection of crops.

(4) Render technical advice to farmers‟ community for the protection of crops in flood, drought and cyclone situation.

(5) Release messages through agriculture extension workers, print and electronic media, TV cable network for the protection of standing crops. Exercise vigilance about pest/disease attack and remain prepared to deal with the disease/problems.

(6) Coordinate with irrigation department during flood/rainy season. Develop plan for agriculture sector for early recovery phase, if needed.

(7) Prepare a detailed report and disseminate it widely. Document lessons learnt from the response experiences and incorporate same in future planning.

7. Livestock Department

(1) Designate a representative to the DEOC.

(2) Arrange assessment on livestock.

(3) Set up mobile veterinary camps e.g. vaccination, de-worming etc in floods, cyclone and drought situation.

(4) Provide animal feed on subsidized rates in emergency situation, particularly in drought.

(5) Monitor situation during emergency period.

(6) In prolonged drought, deliver fodder, de-worming medicines and vaccine for the animals. Exercise vigilance about disease outbreak in the animals and be prepared to deal with the problem.

(7) Develop plan for livestock sector for early recovery phase if needed.

(8) Prepare a detailed report and disseminate it widely .Document lessons learnt from the response experiences and incorporate same in future planning.

8. Irrigation Department

(1) Designate a representative to the DEOC.

(2) Conduct damage assessment of irrigation channels, embankments etc and develop rehabilitation plans.

(3) Monitor canal water flows. Inform DDMA and farmers through irrigation department's network and local media channels etc.

(4) Assist in evacuation process of marooned people by providing boats.

(5) Deploy irrigation staff teams on embankments in flood season.

(6) Take measure to fill canal/distributaries breach.

(7) Coordinate with farmers organization on management and maintenance of the water courses, distributaries and embankments.

(8) Document lessons learnt from response experiences and share it with DDMA and provincial irrigation department.

(9) Incorporate lessons learnt in future planning.

9. Works and Services Department

(1) Designate a representative to the DEOC.

(2) Arrange damage assessment of roads, bridges and other infrastructure.

(3) Deploy team to remove debris.

(4) Facilitate Armed Forces to clear roads, remove debris and undertake restoration of infrastructure.

10. Culture, Social Welfare and Tourism Department

(1) Designate a representative to the DEOC.

(2) Arrange assessment of Internally Displaced Persons (IDP) Camp situation and share it with humanitarian organization working in this area.

(3) Register all affected people living in the camp. Distribute relief material and arrange medical facilities. Set up safe play areas for children.

(4) Monitor protection issues in IDP Camps with particular focus on children and women.

(5) Facilitate the humanitarian organizations working on core issues (child protection, disability, orphanages and separated children).

(6) Coordinate with DDMA to ensure that needs of most vulnerable groups (e.g. minorities, disabled persons, elderly, widows etc) are addressed in emergency response.

(7) Assist DDMA to manage relief camps, undertake relief distribution and carry out early recovery assessment.

(8) Document lessons learnt from the response experiences and share it with all stakeholders including DDMA and provincial, culture, social welfare and tourism departments. Incorporate the same in future planning.

11. Police Department

(1) Designate a representative to the District OEC.

(2) Assist district administration in evacuation.

(3) Maintain law and order in emergency response.

(4) Monitor and maintain normalcy in the relief camps.

(5) Arrange adequate police cover for the humanitarian organizations, embassy representatives, UN officials, dignitaries etc.

(6) Protect life and property.

(7) Assist fast track deployment of emergency vehicles by efficient traffic management.

(8) Provide reflective lights / reflectors around the scene of incident at night, to facilitate the working of rescue workers, fire fighters etc.

(9) Document lessons learnt from the experience. Share it with DDMA and provincial Police Department. Incorporate same in the future planning.

12. Forest and Wild life Department

(1) Designate representative to the District EOC, if and when needed.

(2) Conduct impact assessment of flood/cyclone on fisheries, wild life and mangroves forest.

(3) Coordinate with fire fighting teams, in case of forest fire.

(4) Control deforestation, Plant new saplings in disaster prone areas.

(5) Build capacity of staff at district level on disaster preparedness in wildlife sector.

(6) Control grazing of animals in range land areas to prevent tree depletion.

(7) Supply drought resistant seeds/plants of trees to farmers and communities.

13. Food Department

(1) Arrange security for wheat stores warehouses/gowdowns.

(2) Regularly update DDMA about stocks position.

(3) Release wheat to DDMA on the orders of the Secretary Food Department.

(4) Assist DDMA in distribution of subsidized/free edible commodities to the affected population in the district.

14. Mines and Minerals Department

(1) Assess situation.

(2) Deploy search and rescue team. Coordinate with fire fighters in case of fire in the mine.

(3) Initiate search and rescue operation and provide first aid to the injured workers. Shift them to hospital.

(4) Recommend case for worker compensation in case of loss of life/limb.

15. Pakistan Telecommunication Company Limited/Pakistan Telecommunication Authority

(1) Provide uninterrupted telephone and telegraph facilities during emergency response.

(2) Provide communication services to DEOC round the clock. Make arrangements for alternate communication system. Coordinate with private telecommunication services in the district to get their services if needed.

(3) Issue order to keep telephone exchange open round the clock during emergency operations.

16. Industries Department

(1) Designate a representative for the DEOC, if and when needed.

(2) Immediately deploy fire fighters in case of fire in industrial unit. Evacuate people immediately and provide first aid.

(3) Arrange transportation of personnel and material to affected areas as well as evacuation of the affectees.

(4) Take steps for rehabilitation of the industries adversely affected by disasters.

APPENDIX C PROVINCIAL LEVEL SOPs FOR RESPONSE PHASE

1. Provincial Disaster Management Authorities (PDMA)

(1) Activate PEOC.

(2) Disseminate early warning information to all stakeholders.

(3) Conduct rapid assessment and launch quick response.

(4) Prepare detail plan for the resource requirement for relief operation and send to the PDMC for approval.

(5) Provide food, drinking water, medical supplies, non food items to the affected population.

(6) Keep NEOC abreast of latest situation.

(7) Warn all concerned departments to prepare for emergency response.

(8) Coordinate with NDMA, Armed Forces and keep them informed about the situation and resource mobilization.

(9) Keep print and electronic media updated on regular basis.

(10) Liaise with I/NGOs, UN bodies and philanthropists organizations for resource mobilizations for emergency response.

(11) Organize regular media and public information briefings.

(12) Forward Situation Report (SITREP) on daily and weekly basis to Chief Minister, Governor, PDMC/Equivalent Members, NDMA, Armed Forces etc.

(13) Organize initial and subsequent assessment of disaster affected areas and determine the extent of loss damage and volume and relief required.

(14) Organize detailed assessment for the early recovery programme and prepare proposal and circulate it to the PMDC, NDMA, UN and I/NGOs.

2. Health Department

(1) Designate a representative to the Provincial EOC.

(2) Mobilize and deploy medical teams and paramedic staff for rapid assessment and quick response in the affected areas.

(3) Exercise vigilance about outbreak or possibility of any epidemic/outbreaks. Take effective measures against it.

(4) Support district health teams in carrying out smooth health services in emergency response. Develop plan for health sector in recovery phase, if needed.

(5) Coordinate and facilitate other humanitarian actors working in health sector.

(6) Prepare a detailed report and disseminate it widely.

(7) Document lessons learnt from the response experience and incorporate same in future planning.

3. **Public Health Engineering Department (PHED)**

(1) Designate a representative to the provincial EOC.

(2) Conduct rapid assessment of water and sanitation for emergency response.

(3) Provide safe drinking water according to the Sphere Project Minimum Standards to the affected population in emergency situation.

(4) Provide support to district level PHED for effective emergency response.

(5) Facilitate local and INGOs working on water and sanitation activities in emergency.

(6) Exercise vigilance about any out break/possibility of epidemic outbreak due to water and sanitary conditions. Take effective measures against it.

(7) Ensure that water and sanitation system is operational in public buildings during emergency situation.

4. **Education Department**

(1) Designate a representative to the provincial EOC.

(2) Make arrangements to deploy teachers and student for voluntary assistance in assessment and distribution of relief goods in the affected areas.

(3) Support PDMA, DDMAs, districts level education departments to run emergency mobile schools and provide teaching material to continue education during the emergency.

(4) Prepare a report on response experiences and share it with provincial education department, PDMA and NEOC.

(5) Document lessons learnt from response experiences and widely disseminate it to the relevant stakeholders. Incorporate same in future planning.

5. **Agriculture Department**

(1) Designate a representative to the provincial EOC.

(2) Conduct initial rapid assessment to assess the damage to standing crops.

(3) Provide agriculture machinery to the farmers to protect their crops during flood and cyclone.

(4) Provide technical advice to the farmer community to protect standing crop from any insect attack during floods, cyclones, drought etc.

(5) Release public messages through agriculture extension workers, median and TV cable network, to protect the standing crops.

(6) Exercise vigilance about pest attack on the crop and take effective measures against it.

(7) Coordinate with irrigation department and DDMAs.

(8) Develop plans for agriculture sector for early recovery phase if needed.

(9) Prepare a detailed report and disseminate it widely.

(10) Document lesson learnt from the response experiences and incorporate same in future planning.

6. **Livestock Department**

(1) Designate a representative to the provincial EOC.

(2) Conduct/assist PDMA in rapid assessment on livestock and provide financial and technical resources to the district livestock departments to run the animal camps.

(3) Arrange vaccines for animals in flood, cyclone and drought situation. Support districts livestock departments, DDMAs for the provision of fodder, de-worming medicines and vaccine for the animals in prolonged drought situation.

(4) Make arrangements for delivery of animal feed on subsidized rates in emergency response particularly in drought.

(5) Exercise vigilance about disease attack in animals. Take effective measures against. Coordinate and facilitate humanitarian organizations working in the livestock sector.

(6) Develop plan for the livestock sector for early recovery phase if needed.

(7) Prepare a detailed report and disseminate it widely. Document lessons learnt from response experiences and incorporate same in future planning.

7. **Irrigation Department**

(1) Designate a representative to the PEOC.

(2) Monitor embankment situation during floods and set up camp of irrigation officials on sensitive points of the embankment.

(3) Monitor water flows in canal and its distributaries during the flood season and update EOC on river and canal water flow in monsoon period on daily basis.

(4) Update communities on river and canal water flows through PDMA, DDMAs (as applicable), print and electronic media.

(5) Issue early warning of potential floods or canal breach through media, TV cable operators, police wireless network etc.

(6) Monitor alert and be ready to face any situation e.g. breach of canal/sub distributaries etc.

(7) Coordinate with Armed Forces and indigenous breach filling experts for canal breach filling.

8. **Works and Services Department**

(1) Designate a representative to the provincial EOC.

(2) Conduct infrastructure loss and damage assessment and share it with DDMAs, PDMA and NDMA.

(3) Provision of heavy machinery to the district department and district administration for clearing roads, debris etc.

(4) Take steps to ensure speedy repair and restoration of transport links.

(5) Coordinate with Armed Forces to get their help in restoration of roads and infrastructure e.g. bridges, clearing land slides and clearing road blocks etc.

(6) Support PDMA and district administration by providing temporary structures in relief camps.

(7) Organize repairs to the damaged public buildings and infrastructure for early recovery and rehabilitation.

(8) Prepare a detailed report and disseminate it widely. Document lessons learnt from response experiences and incorporate same in future planning.

9. **Local Government Rural Development and Katchie Abadies**

(1) Designate a representative to the provincial EOC.

(2) Conduct assessment of the water/sanitation and rural infrastructure schemes.

(3) Deploy teams to restore water supply schemes and establish sanitation system for affected communities.

(4) Conduct health and hygiene programme for affected communities.

(5) Promote indigenous water purification methods.

(6) Support districts LG&RD Department to conduct awareness activities on water purification in the affected areas.

(7) Assess the water situation particularly hand pumps and sanitation in disaster prone areas.

(8) Coordinate and facilitate I/NGOs, UNICEF and other agencies working on water/sanitation activities.

(9) Prepare a detailed report and disseminate it widely. Document lessons learnt from response experiences and incorporate same in future planning.

10. **Culture, Social Welfare and Tourism Department**

(1) Designate a representative to the provincial EOC.

(2) Conduct assessment of Internally Displaced People (IDP) camp situation and share it with humanitarian organization working in this area.

(3) Register all affected people live in the camp, arrange distribution of relief material and provide medical facilities in the camp.

(4) Make arrangement for protection of Internally Displaced People (IDPs), especially women and children.

(5) Provide technical support to district social welfare departments in managing of social welfare issues including orphanage centres, safe play areas for children.

(6) Coordinate and facilitate humanitarian organizations working on child protection, orphanages, separated children and disability. Manage social welfare centre and orphanages.

(7) Coordinate with PDMA and DDMAs to ensure that needs of most vulnerable social groups are addressed in emergency response.

11. **Home Department**

(1) Designate a representative to the provincial EOC.

(2) Support district administration in evacuation of affected people and transport to camp sites.

(3) Assist Armed Forces and USAR teams in search and rescue operation.

(4) Maintain law and order situation in relief centres, distribution point and shelter sites.

(5) Ensure security measures for relief material warehouses set up by the government.

(6) Provide security to the foreign dignitaries, donors, UN agencies, and humanitarian organizations, engaged in emergency response as well as visitors to the areas.

(7) Keep close watch for any criminal and anti state activity in the area activities.

(8) Manage traffic during the disaster situation and develop alternative traffic management plan to avoid inconvenience.

(9) Arrange security for government property and installations damaged in disaster.

(10) Maintain public order and internal security. Protect life and property.

(11) Assist local administration to stop theft and misuse of relief material.

(12) Facilitate access for emergency/rescue operation vehicles to the disaster sites.

12. **Forest, Wild life and Fisheries Department**

(1) Conduct assessment on flood/cyclone impact on fisheries and wild life.

(2) Gauge impact of flood/cyclone on mangrove plantation.

(3) Coordinate with fire fighters in case of forest fire.

(4) Nurseries to support NGOs and community to promote tree plantation in the area.

13. **Information Technology Department**

(1) Deploy technical staff to support PDMA and DEOCs in disaster situation.

(2) Monitor the situation and make sure that communication and IT System function smoothly to carry out the relief and rehabilitation work.

14. Transport

(1) Designate a representative to the provincial EOC.

(2) Immediately deploy fire fighters in case of fire in an industrial unit.

(3) Evacuate people immediately and provide first aid.

(4) Arrange transportation of personnel and material to affected areas as well as evacuation of affectees.

(5) Take steps for rehabilitation of industries adversely affected by disasters.

15. **Information and Archives Department**

(1) Designate a representative to the PEOC.

(2) Ensure that the news-items relating to disaster present accurate picture of the actual position and do not create undue panic.

(3) Disseminate information about the short/long term measures initiated by different ministries and departments for relief and rehabilitation of affected people.

(4) Curtail normal programmes to broadcast essential information on disaster if requested by the Chairman NDMA/DG PDMA.

(5) Take steps for projection of news and directives relating to the situation issued by relevant Federal Government agencies including NDMA.

(6) Organize visits by local/foreign journalists to affected areas to prevent misrepresentation/misreporting.

16. **Mines and Minerals Department**

(1) Assess the situation.

(2) Deploy search and rescue team.

(3) Initiate search and rescue operation.

(4) Provide first aid to the rescued workers and shift them to hospital.

(5) Coordinate with PDMA and DDMAs for further assistance

APPENDIX D NATIONAL/FEDERAL LEVEL SOPs FOR RESPONSE PHASE

1. National Disaster Management Authority (NDMA)

(1) Activate NEOC

(2) Organize initial and subsequent assessment of disaster affected areas and determine the extent of loss damage and volume and relief required.

(3) Coordinate and inform all concerned departments to get prepare for emergency response. Keep inform print and electronic media on regular basis.

(4) Coordinate with Armed Forces through JS HQ and Service HQ.

(5) Prepare detailed plan for the resources require for full relief operation.

(6) Coordinate with I/NGOs, UN bodies and philanthropists organizations for resource mobilizations.

(7) Mobilize and deploy resources e.g. search and rescue medical teams in the affected areas.

(8) Supply of food, drinking water, medical supplies and non food items to the affected population.

(9) Organize details assessment for the early recovery programme and prepare proposal and circulate it to the NMDC, Multi and bilateral donors, UN, I/NGOs and philanthropists.

(10) Prepare a transition plan from relief to recovery programme.

(11) Organize regular media and public information briefings.

(12) Prepare situation Report (SITREP) on daily and weekly basis and circulate to the Prime Minister, NDMC members, PMDC members, P/R/SDMAs, Armed Forces etc.

2. **Ministry of Health**

(1) Designate a representative in National Emergency Operations Centre during the emergency period.

(2) Alert and deploy medical teams and paramedic staff in the affected areas for rapid assessment and emergency response.

(3) Exercise vigilance about possibility of any epidemic /outbreak and take effective measures against it.

(4) Provide technical support to PDMA including Gilgit-Baltistan and AJK in carrying out smooth health services in emergency response.

(5) Ensure that WHO protocols on quality and Sphere Minimum Standards are followed by medical professionals in the field.

(6) Coordinate and facilitate with WHO/UNICEF and other humanitarian\ organizations working in health sector in affected areas.

(7) Monitor health situation in the affected areas.

(8) Document the lesson learnt from the response experiences and incorporate same in future planning.

3. **Ministry of Education**

(1) Designate a representative to the National Emergency Operations Centre.

(2) Make arrangements to deploy teachers and students for voluntary assistance in assessment and distribution of relief goods in the affected areas.

(3) Provide support to PDMAs in education sector assessment.

(4) Support PDMA and provincial education authorities to run emergency mobile schools and provide teaching material to continue education during the emergency.

(5) Determine the extent of loss in educational institutions and prepare plans for their rehabilitation.

(6) Prepare a report on the experience and share it with provincial education departments, PDMAs and NEOC.

(7) Document the lesson learnt from the response experiences and incorporate same in future planning.

4. **Ministry of Food, Agriculture and Livestock**

(1) Designate a representative to the National Emergency Operations Centre.

(2) Conduct initial rapid assessment to assess the damage to crops and livestock.

(3) Provide agricultural machinery and necessary tools to the farmers to protect their crop during flood season.

(4) Prepare and release messages and advices for farmer community through NEOC, PEOCs, provincial agriculture departments, print and electronic media to protect standing crops.

(5) Vigilant about pest attack on the crop and take effective measure.

(6) Provide technical advice to the farmer community to protect standing crop during heavy rains, wind storm, flood and cyclone situations.

(7) Support provincial livestock department, for the provision of fodder, de-worming medicines and vaccine for the animals during the drought period.

(8) Coordinate with Federal Flood Commission and NDMA in relation emergency response.

(9) Develop plan for agriculture sector for early recovery phase if needed.

(10) Prepare a detail report and disseminate it to all stakeholders. Document the lesson learnt from the response experiences and incorporate same in future planning.

5. **Ministry of Housing and Works**

(1) Designate a representative to the National EOC.

(2) Carry out detailed technical assessment of damaged public infrastructure.

(3) Support provincial governments in conducting of damage and loss assessment to infrastructure and housing.

(4) Coordinate with FWO/Armed Forces to get their help in clearing land slides, removing road blocks and restoration of infrastructure e.g. bridges.

(5) Provision of heavy machinery to the district department and district administration for clearing roads, debris etc.

6. **Ministry of Local Government and Rural Development**

(1) Designate a representative to the National EOC.

(2) Conduct damage assessment of the water/sanitation and rural infrastructure schemes damages within jurisdiction.

(3) Support NDMA and PDMAs in assessment and provide technical support for water/sanitation activities in emergency response.

(4) Ensure that Sphere Project Minimum Standards are followed in water and sanitation schemes in emergency response.

(5) Introduce simple and cost effective water purification technology in emergencies.

(6) Promote indigenous water purification methods.

(7) Coordinate with NDMA, PDMA and provincial LG&RD Department.

7. **Ministry of Social Welfare and Special Education**

(1) Designate a representative to the National EOC.

(2) Conduct assessment of Internally Displaced Persons (IDP) camp situation and share it with humanitarian organizations working in this area.

(3) Register all affected people living in the camp, arrange distribution of relief material and provide medical facilities in the camp.

(4) Work out measures for protection of Internally Displaced Persons (IDPs), especially women and children.

(5) Ensure that guidelines mentioned above are followed by government authorities and humanitarian organizations.

(6) Provide technical support to provincial social welfare departments in managing social welfare issues e.g. orphanage centres, safe play areas for children etc.

(7) Coordinate and facilitate humanitarian organizations working on child protection issues, disability, orphanages and separated children.

8. **Ministry of Interior**

(1) Carry out search and rescue with the help of Armed Forces.

(2) Support district administration in evacuation of affected people and transport them to the camp sites.

(3) Protect life and property.

(4) Maintain law and order situation in relief centres and shelter sites.

(5) Provide security in relief centres, shelter sites and warehouses set up by the government in disaster affected areas.

(6) Arrange security for government property and installations damaged in disaster.

(7) Provide security to the foreign dignitaries, donors, UN agencies, and humanitarian organization visiting and engaged in relief operations.

(8) Keep close watch for any criminal and anti state activity in the affected area.

(9) Manage traffic during disaster situation in the affected area.

9. **Ministry of Information Technology**

(1) Designate a representative to the National EOC.

(2) Ensure that IT and telecommunication system functions well during disaster times for effective emergency response.

(3) Engage private sector IT firms to provide support during disaster.

(4) Deploy technical staff to support EOCs and PDMAs in disaster situation.

(5) Monitor situation and ensue that communication and IT System function smoothly to carry out emergency response.

(6) Document the lesson learnt from the response experiences and incorporate same in future planning.

10. **Ministry of Information and Broadcasting**

(1) Ensure that the news-items relating to disaster reflect accurate picture and do not create undue panic.

(2) Take steps for due projection of news directives relating to the situation issued by the Federal Government agencies concerned with response, including NDMA.

(3) Disseminate information about the short/long term measures initiated by different ministries and departments for relief and rehabilitation of affected people.

(4) Curtail normal programmes to broadcast essential information on disaster, if requested by the Chairman NMDA.

(5) Arrange comprehensive media rebuttal in events of any distorted news projections by segment of local/foreign media, in concert with NDMA.

11. **Ministry of Railways**

(1) Designate a focal person in National EOC if and when needed.

(2) Transport relief material from ports and airports to the disaster affected areas.

(3) Monitor the situation of railway tracks and update NDMA on regular basis particularly in earthquake, floods and cyclone situations.

12. **Ministry of Youth Affairs**

(1) Designate a representative to the National EOC, if and when needed.

(2) Deployment of volunteers with consultation of NEOC, PEOCs for emergency.

(3) Prepare report and share it with NDMA.

(4) Document the lessons learnt from the response experience and widely share with stakeholders through NDMA.

(5) Incorporate same in future planning.

13. **Ministry of Water and Power**

(1) Designate a representative to the National EOC, if and when needed.

(2) Keep update on river water flow situation to NDMA and provinces.

14. **Ministry of Defence**

(1) Designate a representative in NEOC, PEOCs and DEOCs (as applicable).

(2) Conduct survey in affected areas and assess requirements of relief and recovery needs.

(3) Provide helicopters, aircrafts, ships etc for assessment, search and rescue and evacuation in complex emergencies, when required.

(4) Support NDMA, PDMAs, DDMAs in emergency response e.g. search and rescue, evacuation, distribution of food, non food items, tent village, medical camps, debris clearance, transportation of injured and dead bodies etc.

(5) Deploy professional teams e.g. medical doctors (for health services) engineers (to restore the communication and infrastructure network, breach filling) and manpower (to clear roads, lift debris, control traffic on main roads, maintain law and order, help in the camp site management, provision of drinking water supply etc).

(6) Close coordination with NDMA, PDMAs during emergency response.

15. **Ministry of Foreign Affairs**

(1) Designate a representative to the National EOC, if and when required.

(2) Work as focal point for the deployment of aid workers in the region, in case of major disaster, and coordinate support given by the Government of Pakistan.

(3) Facilitate issue of visas to foreign humanitarian relief workers so that they can promptly access the affected areas.

(4) Coordinate with foreign countries to obtain aid in case of major disaster.

(5) Coordinate with NDMA on issue of foreign humanitarian aid.

16. **Federal Flood Commission**

(1) Designate a representative to the National EOC.

(2) Update NEOC on river water flow in flood situation on daily basis.

(3) Coordinate with provincial irrigation departments and get update.

(4) Prepare updates on flood protection bunds, canal system and share it with NDMA, PDMAs.

17. **Civil Defence**

(1) Designate a representative to the NEOC/PEOCs/DEOCs (as applicable).

(2) Assist NDMA, PDMAs, DDMAs in search and rescue and evacuation in different kinds of disasters.

(3) Divide potential affected sites in various zones. Each zone to be controlled by designated appointment in case of major disaster. Alternatives to be nominated by therein.

(4) Provide first aid to injured persons and transport them to nearest hospital.

(5) Assist fire brigade staff in search and rescue and first aid operations related to fire and other incidents.

(6) Assist health department in treatment of injured victims, load dead bodies in the ambulance and disposal of dead bodies.

(7) Organize vehicle parking arrangements with help of traffic police at district level.

(8) Assist DEOCs and police department in setting up of information system for members of public, whose relatives, friends and family members are lost or missing.

18. **Coast Guards**

(1) Designate a representative in NEOC/PEOCs/DEOCs particularly in cyclone season and monsoon period.

(2) Assist DDMAs in relief operation.

(3) Assist DDMA in assessment of damage and losses of the coastal public property and prepare a report and share it with DDMAs, PDMAs, NDMA.

(4) Assist DDMAs, PDMAs and NDMA to evacuate communities from the coastal areas in case of cyclone or another sea related hazard.

(5) Coordinate and closely work with NDMAs, PDMAs, DDMA in case of any coastal area disaster.

19. **Emergency Relief Cell**

(1) Designate a representative to the National EOC.

(2) Immediately release relief goods in case of disaster.

(3) Coordinate international relief assistance in case of major catastrophe in consultation with NDMA.

(4) Closely work and coordinate with NDMA.

20. **Fire Services**

(1) Deploy fire fighting teams.

(2) Rescue people.

(3) Coordinate with NDMA/PDMAs/DDMAs.

21. **National Logistics Cell (NLC)**

(1) Designate a representative to the National EOC, if and when needed.

(2) Provide vehicles to transport relief goods.

(3) Act as coordinator of road transport agencies during disaster.

(4) Ensure smooth transportation of relief goods in the affected areas.

(5) Support government in technical appraisal of projects/programmes pertaining to roads, road transport, railways, ports and shipping.

(6) Liaise with private transport agencies on behalf of NDMA if needed.

22. **Space and Upper Atmosphere Research Commission (SUPARCO)**

(1) Provide remote sensing and satellite maps.

(2) Prepare post disaster imagery maps.

23. **Pakistan Meteorological Department**

(1) Inform public on the weather forecast and issuing warning in case of potential threat.

(2) Disseminate flood information to the provinces and districts heads by phone and fax on daily basis during flood season.

(3) Share weather forecasts and early warning information with NDMA, PDMAs on regular basis in monsoon period.

(4) Coordinate with Federal Flood Commission, Flood Warning Centre in monsoon period.

(5) Collect rain data on regular basis, consolidate it and share it with NDMA.

24. **Capital Development Authority**

(1) Designate a representative to the National EOC, if and when needed.

(2) Provide fire fighting vehicles, cranes, dumpers, loaders, shovels, excavators, road cutters etc.

(3) Coordinate with NDMA/PDMAs.

25. **Media**

(1) Provide public timely and provide factual information during emergency response.

(2) Influence decision makers to take immediate and appropriate action for emergency response.

(3) Relay public awareness messages on health and other issues which help to reduce the human losses.

(4) Highlight needs and issues of survivors during the disaster time.

(5) Curtail normal programme to broadcast essential information on emergency response.

26. **Civil Aviation Authority**

(1) Designate a representative to the National EOC and PEOCs, if and when needed.

(2) Keep airport staff alert.

(3) Designate focal person during disaster time.

(4) Facilitate humanitarian organizations, embassies and other bilateral organizations for relief material during the disaster period.

(5) Facilitate humanitarian organizations, UN air charters for landing and take off for relief activities.

(6) Provide space for storage relief goods during disaster time.

27. **Rescue 1122 Services**

(1) Deploy fire fighting teams.

(2) Cordon the area.

(3) Immediately send ambulances and search and rescue teams after receiving phone call.

(4) Rescue people.

(5) Provide first aid.

(6) Evacuate seriously injured people to hospital for further assistance.

(7) Transport dead bodies and transfer to the government authorities/hospitals.

(8) Coordinate with NDMA/PDMAs/DDMAs.

28. **Edhi Foundation**

(1) Provide ambulance service for the transportation of injured and dead bodies to the hospital.

(2) Provide first aid to the injured people.

(3) Provide relief items e.g. food, clothes, kitchen sets etc.

(4) Provide rescue and medical services.

29. **Pakistan Humanitarian Forum (PHF)**

(1) Designate a representative in the NEOC, if and when needed.

(2) Organize/conduct joint assessment and share report with PHF members, NDMA, PDMAs and DDMAs.

(3) Assist DDMAs in emergency response. Provide relief support food and non food items to the affected population.

(4) Ensure that PHF members follow the Sphere Project Minimum Standards in disaster response.

(5) Design a coordinated joint response in the light of the assessment report findings.

(6) Closely work with NDMA, PDMAs and DDMAs during the disaster time.

30. **Pakistan Red Crescent Society**

(1) Designate a representative to the NEOC, PEOCs and DEOCs (as applicable).

(2) Assist DDMAs in evacuation process in the affected area.

(3) Provide ambulance for rescue and transporting injured people.

(4) Provide medical services to the affected population.

(5) Coordination with NDMA, PDMAs, DDMAs, NGOs, INGOs, relief agencies for emergency response.

(6) Coordinate operations of national and international components of Red Cross/Red Crescent Movements, operating in disaster affected areas.

(7) Coordinate with DM authorities and UN agencies for post disaster relief work.

31. **United Nations Agencies**

(1) Designate a representative to the National EOC.

(2) Provide relief goods through government and partner organizations.

(3) Form thematic clusters according to the expertise and capacity of the humanitarian agency and organize cluster weekly meeting and update NDMA, PDMAs and DDMAs accordingly.

(4) Conduct assessment in specific areas e.g. water/sanitation health, child protection, women issues in camps management, shelter, security, water and sanitation food security and response accordingly.

(5) Organize and facilitate weekly coordination meetings for effective response.

(6) Coordinate with NDMA and PDMAs and update them about the progress.

(7) Conduct assessment for early recovery programme and share it with NDMA.

(Source: NDMA, 2010)

APPENDIX E: APPROVAL OF EXEMPT HUMAN RESEARCH

University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Exempt Human Research

From: **UCF Institutional Review Board #1**
FWA00000351, IRB00001138

To: **Sana Khosa**

Date: **March 11, 2013**

Dear Researcher:

On 3/11/2013, the IRB approved the following activity as human participant research that is exempt from regulation:

Type of Review:	Exempt Determination
Project Title:	Multi-level and Interorganizational Collaborative Network Response to Disasters: The Case of Pakistan Floods 2010
Investigator:	Sana Khosa
IRB Number:	SBE-13-09092
Funding Agency:	
Grant Title:	
Research ID:	N/A

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these changes affect the exempt status of the human research, please contact the IRB. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., UCF IRB Chair, this letter is signed by:

Signature applied by Joanne Muratori on 03/11/2013 03:45:04 PM EST

IRB Coordinator

APPENDIX F: EXPLANATION FOR EXEMPT RESEARCH

EXPLANATION OF RESEARCH

Title of Project: Multi-level and Interorganizational Collaborative Response to Disasters: The Case of Pakistan Floods 2010

Principal Investigator: Sana Khosa

Faculty Supervisor: Dr. Naim Kapucu

You are being invited to take part in a research study. Whether you take part is up to you.

The purpose of this research is to identify the factors that facilitate and hinder interorganizational collaborative response in disasters and in particular the Pakistan Floods of 2010. The identification and understanding of these factors is important to ensure that current interorganizational response is improved so that future disasters can be tackled and addressed in better and more collaborative ways.

You will be asked to narrate your collaborative experience in the 2010 Floods and the role your organization played. You will be also asked about the agencies you partnered with to respond effectively to the floods. This interview will take place via telephonic conversation and if that is not possible then a short questionnaire will be emailed with interview questions. The interview will not take more than 30 mins. In case an interview is not possible a response to an email will be expected within a week.

You must be 18 years of age or older to take part in this research study.

Study contact for questions about the study or to report a problem: If you have questions, concerns, or complaints you may contact: Sana Khosa, Doctoral Student, Public Affairs, College of Health and Public Affairs, (407) 446 -8314 or by email at sanakhosa@knights.ucf.edu.

IRB contact about your rights in the study or to report a complaint: Research at the University of Central Florida involving human participants is carried out under the oversight of the

Institutional Review Board (UCF IRB). This research has been reviewed and approved by the IRB. For information about the rights of people who take part in research, please contact: Institutional Review Board, University of Central Florida, Office of Research & Commercialization, 12201 Research Parkway, Suite 501, Orlando, FL 32826-3246 or by telephone at (407) 823-2901.

APPENDIX G SEMI-STRUCTURED INTERVIEW QUESTIONS

1. Was your organization collaborating and cooperating with multiple organizations during response?
2. What was the nature of collaboration with other organizations? Which were your closest partners in responding to floods (international agencies, federal, provincial and district level departments)?
3. Does your organization, on a regular basis, engage in relationship-building activities with other agencies such as training drills and exchange of ideas?
4. Do you engage in and avail opportunities to form newer partnerships with other and newly formed agencies working in the community? If not, why not?
5. What type of institutional (plans, policies, response systems) support was available in responding to the floods?
6. Do you think there is local capacity for responding effectively? If not, what is required to build capacity?
7. What are the main factors facilitating effective response?
8. What are the key factors hindering effective response?

APPENDIX H ORGANIZATIONS IN THE DISTRICT PLANNED RESPONSE NETWORK

Agriculture Department	Agri Dept
Armed Forces	Armed Forces
Community Based Organizations	CBOs
Charity and Donor Agencies	Charity and Donor Agencies
Culture, Social Welfare and Tourism Department	CSW & T Dept
District Coordination Officer	DCO
District Disaster Management Authority	DDMA
District Emergency Operations Center	DEOC
Education Department	Edu Dept
Embassy Officials/United Nations Officials	Emb and UN Officials
Farmer's organization	Farmer's org.
Firefighting teams	Firefighters
Food Department	Food Dept
Forest and Wildlife Department	F & W Dept
Health Department	Health Dept
Humanitarian Organizations	HOs
Industries Department	Industies Dept.
International Non-governmental Organizations	INGOs
Irrigation Department	Irrigation Dept
Livestock Department	Livestock Dept
Local Mosques	Local Mosques
Local Newspapers	Local Media
National Disaster Management Authority	NDMA
National Emergency Operations Center	NEOC
Nongovernmental Organizations	NGOs
Pakistan Telecommunication Co. Ltd	Private Telecom
Provincial Disaster Management Authority	PDMA
Provincial Emergency Operations Center	PEOC
Police Department	Police Dept
Provincial Culture Social Welfare and Tourism Dept	Provincial CSW & T Dept
Provincial Health Department	Provincial Health Dept
Provincial Police Department	Provincial Police Dept
Provincial Irrigation Department	Provincial Irrigation Dept
Public Health Engineering Department	PHED
Secretary Food Department	Secretary Food Dept
Social Welfare Humanitarian Organizations	SW HOs

Tehsil Municipal Administration	TMA
United Nations Agencies	UN Agencies
Union Council	UC
Volunteers	Volunteers
Water and Sanitation International NGOs	WASH INGOs
Works and Services Department	W & S Dept

APPENDIX I ORGANIZATIONS IN THE PROVINCIAL PLANNED RESPONSE NETWORK

Agriculture Department
Agriculture Extension Workers
Armed Forces
Community Based Organizations (CBOs)
Charities
Chief Minister (CM)
Culture, SW and Tourism Department
DCOs
DDMAs
DEOCs
District Edu Depts
District level PHEDs
District LG & RD Depatments
District Livestock Depts
District SW deparments
District W and SD
Education Department
Farmers
Federal Agencies
Firefighting Units
Forest, Wildlife and Fisheries Dept
Governor
Health Department
Health HOs
Home Department
HOs
Industries Commerce Transport and Labor Dept
Information and Archives Dept
INGOs
Irrigation Department
IT Department
Livestock Department
Livestock HOs
Local Govt Rural Development
Local WASH NGOs
Media
Medical Teams

Mines and Minerals Dept
NDMA
NEOC
NGOs
PDMA
PDMC
PEOC
Private sector Agencies
Pronvincial Ministries
Public Health Engineering Department (PHED)
Social welfare Cente
SW HOs
UN Agencies
UNICEF
USAR teams
WASH INGOs
Works and Services Department

APPENDIX J ORGANIZATIONS IN THE NATIONAL PLANNED RESPONSE NETWORK

Armed Forces	Armed Forces
Army	Army
Army Engineers	Army Engineers
Capital Development Authority	CDA
Charities	Charities
Civil Aviation Authority	CAA
Civil Defense	Civil Def
Coast Guards	CGs
Components of Red Cross/ Red Crescent Movements,	Red Crescent Movements,
DCOs	DCOs
DDMAs	DDMAs
DEOCs	DEOCs
District Departments	DDs
DM Authorities	DM Authorities
Donors	Donors
Edhi Foundation	Edhi
Embassies,	Embassies
Emergency Relief Cell	ERC
Farmers Community	Farmers
Federal Flood Commission	FFC
Fire Departments	Fire Depts
Fire Services	Fire Services
Flood Warning Center (FWC)	FWC
Foreign Countries	Foreign Countries
GoP	GoP
Health Departments	Health Depts
Health sector Humanitarian Agencies	Health HOs
HOs	HOs
INGOs	INGOs
Local hospitals	Local hospitals
Media Agencies	Media
Medical Doctors	Medical Doctors
Medical Teams	Medical Teams
Ministry of Defence	M of D
Ministry of Education	M of Edu

Ministry of Food, Agriculture and Livestock	M of FAL
Ministry of Foreign Affairs	M of FA
Ministry of Health	M of Health
Ministry of Housing and Works	M of HW
Ministry of Information and Broadcasting	M of IB
Ministry of Interior	M of Interior
Ministry of IT	M of IT
Ministry of Local Government and Rural Development	M of LGRD
Ministry of Railways	M of R
Ministry of Social Welfare and Special Education	M of SWSE
Ministry of Water and Power	M of WP
Ministry of Youth Affairs	M of YA
National Highway Authority	NHA
National Logistics Cell (NLC)	NLC
Navy	Navy
NDMA	NDMA
NEOC	NEOC
NGOs	NGOs
NMDC	NMDC
Other bilateral Agencies	Other bilateral Agencies
Pakistan Humanitarian Forum (PHF)	PHF
Pakistan Meteorological Dept	MET
Pakistan Red Crescent Society (PRCS)	PRCS
PDMAs	PDMAs
PEOCs	PEOCs
PIA,	PIA
PM	PM
PMDC	PMDC
Police Departments	PDs
Private Sector IT Firms	Private Sector IT Firms
Private Transport Agencies	Private Transport
Provincial Agri Depts	Provincial Ads
Provincial Educational Departments	Provincial Eds
Provincial govts	Provincial govts
Provincial Irrigation Departments	Provincial IDs
Provincial LG & RD department.	Provincial LG & RD
Provincial Livestock Department	Provincial LDs
Provincial SW Depts	Provincial SW Depts

Rescue 1122 Services	Rescue 1122
Space and Upper Atmosphere Research Commission (SUPARCO)	SUPARCO
SW Humanitarian agencies,	SW HOs
Traffic Police	Traffic Police
UNICEF	UNICEF
United Nations Agencies	UN
USAR Teams	USAR
Volunteers	Volunteers
WHO	WHO

APPENDIX K ORGANIZATIONS IN THE DG KHAN RESPONSE NETWORK

All Pakistan Textile Mills Association	APTMA
Amir Welfare Foundation	AWF
Army and Rangers	Army
Army Engineers	Army Engineers
Chief Secretary Punjab	CS Punjab
CM Punjab	CM Punjab
DCO DG Khan	DCO DGK
DG Khan Commissioner	DGK Comm
Helping Hands for Relief and Development (HHRD)	HHRD
Irrigation and Power Department	Irrigation Dept
ISPR	ISPR
National Highway Authority	NHA
NDMA	NDMA
Nespak (National Engineering Services Pakistan)	Nespak
Pakistan Air Force(PAF)	PAF
Pakistan Army's Lahore Corps	Lahore Corps
PML-Q Leader (Pervaiz Elahi)	PML-Q
PRCS	PRCS
Punjab Ministry for Human Rights	PMHR
Punjab Health Department	PHD
Punjab Information Dept	PID
Punjab Police	Ppolice
DCO Sheikhupura	DCO Sheikhupura
Social Welfare Society Sheikhupura	SWS Sheikupura
UNICEF	UNICEF
WFP	WFP
WHO	WHO
local NGOs DG Khan	Local NGOs
QuaideAzam Medical College	QMC
BV Hospital Bahawalpur	BV Hospital
	PARCO

APPENDIX L ORGANIZATIONS IN THE MUZZAFARGARH RESPONSE NETWORK

Army (Including Corps/Army camps/Amry Engineers/ISPR/ COAS)	Army
Army Medical Doctors (doctors and paramedical officers)	Army Medical Docs
CM Punjab	CM
MG Commissioner	Commissioner
Edhi	Edhi
UNICEF	UNICEF
Punjab Health Department	Punjab Health Dept
Nishtar Hospital	Nishtar Hospital
Allama Iqbal Medical College	AIMC
Jinnah Hospital/ KEMU/Medical Teams	Medical Teams
EDO (H) Office Multan	EDO (H)
Helping Hands for Relief and Development (HHRD)	HHRD
Irrigation Department	Irrigation Dept
Lahore Chamber of Commerce & Industry	LCCI
Met Office	MET
Ministry for Overseas Pakistanis	Ministry for OP
MSB (SIDA) (Swedish Civil Contingencies Agency)	SIDA
Muzaffargarh District Administration	Muzaffargarh District Administration
National Logistics Cell	NLC
Pakistan Medical Association (PMA) Lahore	PMA
Services Hospital	Services Hospital
Mayo Hospital	Mayo Hospital
Pakistan Poverty Alleviation Fund	PPAF
Plan International	Plan Int
PM Gillani	PM
PML (N) Flood Relief Committee	PML (N)
Punjab Industrial Estates	Punjab Industrial Estates
PRCS	PRCS
Punjab Governor Salman Taseer	Governor
Provincial Monitoring Cell	PMC
Rescue 1122	Rescue 1122
Saudi Arabia	Saudi Arabia
Social Welfare Department	SW Dept

UAE	UAE
UNFPA	UNFPA
University of Health Sciences (UHS)	UHS
WFP	WFP
Local NGOs	Local NGOs
WHO	WHO

APPENDIX M ORGANIZATIONS RESPONDING AT THE PROVINCIAL LEVEL OF RESPONSE

All Pakistan Textile Mills Association (APTMA)	APTMA
American Red Cross,	American RC
Austrian Red Cross	Austrian RC
Bank of Punjab	BoP
Board of Revenue Punjab	BoR Punjab
Canadian Red Cross,	Canadian RC
Caritas	Caritas
Chief Secretary Punjab	CS Punjab
CM Punjab	CM Punjab
Danish Red Cross	Danish RC
Department of Livestock	Livestock Dept
Developers Association Fsd	DAF
DHQ hospitals	DHQ hospitals
Falah- e-Insaniyat	FeI
Farmers Associates of Pakistan (FAP)	FAP
Flood Forecasting Division	FFD
Food and Agriculture Organization	FAO
German Red Cross	German RC
GoP	GoP
Governor Flood Relief Fund/ Governor Punjab	Governor Punjab
Guard Group	Guard Grp
Helping Hands for Relief and Development (HHRD)	HHRD
ICRC (International Committee of Red Cross)	ICRC
International Federation of Red Cross and Red Crescent Societies	IFRC
IOM	IOM
Iranian Consul General	Iranian Consul
Jammat-ud-Dawa	JuD
Lahore Chamber of Commerce	Lhr CoC
LAHORE Gymkhana Club	Lhr Gym
Mayo Hospital Lahore	Mayo Hosp
Ministry of Food and Agriculture	MoFA
Ministry of Health	MoH
Ministry of Law and Parliamentary Affairs	MoLPA
Minstry of Finance, Punjab	MoF
Mobile Medical Teams	MMTs

NDMA	NDMA
OCHA	OCHA
Oxfam Novib	Oxfam
Packages Group	Packages Grp
Pakistan Army	Army
Pakistan Meteorological Department (PMD)	MET
Pakistan Navy	Navy
Pakistan People's Party (PPP)	PPP
Pakistan Pharmaceutical Manufacturers Association	PPMA
Pakistan Rangers	Rangers
PDMA/Punjab's Relief and Crisis Management Department	PDMA
People's Lawyers Forum (PLF) Punjab	PLF
PM Gillani	PM
PML-Q	PML-Q
PRCS (Pakistan Red Crescent Society)	PRCS
Presbyterian Disaster Assistance (PDA)	PDA
Principal Institute of Ophthalmology	PIO
Public Health Engineering Department Punjab	PHED
Punjab Agriculture Department	Agri. Dept.
Punjab Board of Investment and Trade (PBIT)	PBIT
Punjab Cabinet	Punjab Cabinet
Punjab Department of Food	Food Dept.
Punjab Education Foundation (PEF)	PEF
Punjab Environment Protection Department (EPD)	EPD
Punjab Flood Relief Commission	FRC
Punjab Governor	Governor Punjab
Punjab Goverrment's Relief Fund	Punjab Goverrment's Relief Fund
Punjab Health Department	Health Dept
Punjab Irrigation Department	Irrigation Dept
Punjab Ministry for Finance and Planning & Development	PMFPD
Punjab Police	PP
Punjab Relief Dept	Relief Dept
Punjab Revenue Department	Revenue Dept
Punjab Water Council	PWC
Quaid-e-Azam Industrial Estate (QIE)	QIE
Rajanpur Relief Operation Director	Rajanpur ROD
Relief and Crisis Management Punjab	R&CMgt
Rescue II22	Rescue 1122

Sheikhupura Chamber of Commerce and Industry	Sheikhupura CoCI
Social Welfare Department, Punjab	SWD
Spanish Red Cross	Spanish RC
Special Support Group (SSG)	SSG
Sui Northern Gas Pipelines Ltd (SNGPL)	SNGPL
Swedish Red Cross	Swedish RC
THQs	THQs
TMAs	TMAs
Turkish Red Crescent	Turkish RC
UK govt	UK govt
UN	UN
UNDSS/OCHA	UNDSS
UNFPA	UNFPA
UNICEF	UNICEF
US Consul General in Lahore	US consul Lhr
US govt	US govt.
USAID/OFDA	USAID/OFDA
WFP	WFP
WHO	WHO

APPENDIX N ORGANIZATIONS PARTICIPATING AT THE NATIONAL-INTERNATIONAL LEVEL OF RESPONSE

Azerbaijan Embassy	AB Embassy
Ansar Burney Trust International	AB Trust
Abaseen Foundation UK	Abaseen
ACF International (Action Against Hunger)	ACF Int
ACT Alliance Pakistan	ACT
ACTED	ACTED
ActionAid International	ActionAid
Asian Development Bank	ADB
AECID	AECID
Afghanistan government	Afg gov
Age International	Age Int
Al-Bario Engineering	Al-Bario
All Pakistan Textile Mills Association (APTMA)	APTMA
American Red Cross	ARC
Pakistan Army	Army
Australian government	Australian gov
Australian Red Cross	Australian RC
Austrian Red Cross	Austrian RC
Aware Girls	Aware Girls
British Charities	BC
British Conservative Party	BCP
Belgium Red Cross	Belgium RC
Bill and Melinda Gates Foundation	Bill and Melinda
Benazir Income Support Programme (BISP) / GoP	BISP
Bank of Punjab	BoP
BRAC Pakistan	BRAC
Brazil government	Brazil gov
British Red Cross	British RC
Brooke International	Brooke
BRSP	BRSP
CAFOD	CAFOD
Canadian govt	Canadian Gov
Canadian Minister for International Cooperation	Canadian MIC
Canadian Red Cross	Canadian RC
Care International	Care
Caritas	Caritas

Construction Company of Germany	CC Germany
Construction Companies of Canada	CCs Canada
CDO	CDO
CERD	CERD
United Nation's Central Emergency Response Fund (CERF)	CERF
China government	China gov
Christian Aid	Christian Aid
Canadian International Development Agency (CIDA),	CIDA
CM Punjab	CM Punjab
Coca Cola	Coca Cola
Concern Worldwide	CW
Church World Service	CWS
Danish embassy	D Embassy
Disasters Emergency Committee (DEC)	DEC
Department of Agri	Dept of Agri
UK Department of International Development	DFID
Danish Red Cross	DRC
Economic Affairs Division	EAD
The European Commission	EC
The Edhi Foundation	Edhi
Government of Egypt	Egypt gov
Environment Consultancies & Options	Env Con
Emergency Relief Cell (ERC), Islamabad	ERC
Pakistan Emergency Response Fund (ERF)	ERF
Evacuee Trust Property	ETP
Finnish Red Cross,	F RC
Flood Emergency Cell	FEC
Falah-e-Insaniat Foundation	FeI
Federal Flood Commission (FFC)	FFC
French Foreign Ministry	FM French
German Foreign Minister	FM German
Foreign Ministry of Malaysia	FM Malaysia
Federal Board of Review (FBR)	FRB
French government	French gov
French Red Cross	French RC
Federal Shariat Court (FSC)	FSC
Pakistan Federal Union of Journalists	FUJ
German Embassy	G Embassy

General Electric	GE
Geo Network	Geo
German government	German gov
Glascow City Chambers	Glascow CCs
GoP	GoP
Punjab Governor	Governor
Global Peace and Security Fund	GPSF
German Red Cross (GRC)	GRC
Handicap International	Handicap
Helping Hand for Relief and Development (HHRD)	HHRD
Help in Need	HIN
HUMAN Rights Commission of Pakistan (HRCP)	HRCP
Industrial Alliance	IA
Islami Center Boston	ICB
InternationalCrisisGroup	ICG
International Committee of the Red Cross (ICRC)	ICRC
Islamic Development Bank	IDB
IFRC	IFRC
Imran Khan Flood Relief (IKFR)	IKFR
Indian Ministry for External Affairs	IMEA
IMF	IMF
Indian government	Indian gov
Government of Indonesia	Indo gov
International Organisation for Migration	IOM
Islamic Relief	IR
Iranian Consul General	Iranian CG
International Rescue Committee	IRC
Indus River System Authority	IRSA
Insaaf Student Federation (ISF)	ISF
Inter Services Public Relations (ISPR)	ISPR
Government of Italy	Italy gov
Government of Japan	Japan gov
Johanniter	Johanniter
Japan Platform	JP
Japanese Red Cross	JRC
Jamaat-ud-Dawa	JuD
Kabani & Company	K&C
Kissan Board Pakistan (KBP)	KBP

Republic of Korea	Korea
Kuwait Red Crescent Society (KRCS)	KRCS
Kuwait government	Kuwait gov
Levis Strauss Pakistan	Levis
The Labour Party Pakistan	LP
Lahore Electric Supply Company	LRSC
Ministry of Foreign Affairs	M o FA
Ministry for Communications	M of C
Ministry of Foreign Affairs, India	M of FA India
Ministry of Food, Agriculture and Livestock	M of FAL
Ministry of Finance, Revenue, Economic Affairs	M of Finance
Ministry of Health	M of H
Ministry of Housing and Works	M of H&W
Ministry of Human Rights	M of HR
Ministry of Interior	M of I
Ministry of Information, Broadcasting and National Heritage	M of IB&N
Ministry of Law and Parliamentary Affairs	M of L&PA
Ministry for Overseas Pakistanis	M of OP
Ministry for Pakistan railways	M of PR
Ministry of State for Finance and Economic Affairs	M of SF&EA
Ministry of State for Information	M of SI
Ministry of Social Welfare and Special Education	M of SW
Ministry of Water and Power	M of W&P
Malaysian Government	Malaysian gov
Monsanto AgriTech	MAT
Merlin	Merlin
MET Office	MET
Pakistan Military	Military
Mir Khalilur Rehman Foundation (MKRF)	MKRF
Medecins Sans Frontieres	MSF
Muslim Aid	MuslimAid
Minhaj Welfare Foundation (MWF)	MWF
NADRA	NADRA
Deputy Speaker National Assembly	National Assembly
NATO	NATO
Pakistan Navy	Navy
National Bank of Pakistan	NBP
NCHC	NCHC

NDMA	NDMA
National Disaster Management and Logistics Cell,	NDMLC
Nespak (National Engineering Services Pakistan)	Nespak
NetSol Technologies	NetSol
National Highways and Motorway Police (NH & MP)	NH & MP
National Highway Authority	NHA
Norweign Government	Norweign gov
Norweign Red Cross	Notweign RC
National Press Club (NPC)	NPC
Netherlands Red Cross	NRC
National Weather Forecasting Centre	NWFC
New Zealand Red Cross	NZRC
OCHA	OCHA
Islamic Conference Organisation (OIC)	ICO
Organisation of Islamic Countries (OIC)	OIC
OM	OM
Orascom Telecom Holding /Mobilink	Orascom
Orient Electronics	Orient
Open Society Institute	OSI
Oxfam	Oxfam
Pakistan Association in Dubai (Pad)	Pad
Pakistan Air Force (PAF)	PAF
Pakistan Association of Greater Boston (PAGB)	PAGB
Embassy of Pakistan in US	Pak Embassy US
Pampers Pakistan	Pampers
PARCO	PARCO
Provincial Reconstruction, Rehabilitation and Settlement Authority (PaRRSA	PaRRSA
Pakistan Board of Investment	PBOI
Planning Commission	Pcom
Punjab Cabinet	PC
Pakistan Census Commission	PCC
Pakistan Cotton Ginners' Association	PCGA
Pakistan Council of Research in Water Resources (PCRWR)	PCRWR
Presbyterian Disaster Assistance (PDA)	PDA
PDMA Punjab	PDMA
Pakistan Embassy in China	PE in China
Pakistan Embassy in the US	PE in US
Pentagon	Pentagon

Pakistan Electric Power Company (Pepco)	Pepco
Pakistan Foreign Office Women's Association (PFOWA)	PFOWA
Parks and Horticulture Authority(PHA)	PHA
Pakistani High Commission in London	PHC in London
Pakistan High Commission Malaysia	PHC in Malaysia
Pakistan High Commission in UK	PHC in UK
Punjab Health Department	PHD
People in Need	PIN
People's Liberation Army (PLA)	PLA
Plan UK	Plan
People's Lawyers Forum (PLF) Punjab	PLF
PM	PM
PML Unification Group	PML UG
PML-N	PML-N
PML-Q	PML-Q
Pakistan Poverty Alleviation Fund	PPAF
PPP	PPP
Pakistan Red Crescent Society	PRCS
President Pakistan	President
Pakistan Rural Support Program	PRSP
Population Services International (PSI)	PSI
Pakistan Trader Front	PTF
Pakistan Tehreek-e-Insaaf (PTI)	PTI
Pakistan Unilever	PU
Qatar Charity	QC
Pakistan Railways	Railways
Pakistan Rangers	Rangers
Relief International	RI
Royal Saudi Air Force	RSAF
Embassy of Spain	S Embassy
South Asian Free Media Association (SAFMA)	SAFMA
Salik Foundation	Salik
Saudi Embassy in Pakistan	Saudi Embassy
Saudi government	Saudi gov
State Bank of Pakistan	SBP
Supreme Court	SC
Saudi Development Fund (SDF)	SDF
Secours Islamique	Secours

MSB (SIDA) (Swedish Civil Contingencies Agency)	SIDA
Singapore Red Cross	Singapore RC
Sui Northern Gas Pipelines Ltd (SNGPL)	SNGPL
Spanish Red Cross	Spanish RC
Special Support Group (SSG)	SSG
Save the Children	STC
Social Welfare Department	SWD
Swedish Red Cross,	Swedish RC
Tear fund	Tearfund
Turkish International Cooperation and Development Agency (TIKA)	TIKA
Tehreek Minhaj-ul-Quran	TMuQ
Turkish Red Crescent (TRC)	TRC
Trocaire	Trocaire
Turkish government	Turkish gov
UAE	UAE
United Arab Emirates Red Crescent Authority (UAE-RCA)	UAE-RCA
UK government	UK gov
United Nations (UN)	UN
United Nations' Food and Agricultural Organization (UN FAO)	UN FAO
UNDAC	UNDAC
United Nations Department of Safety and Security (UNDSS)	UNDSS
UNFPA	UNFPA
UN-Habitat	UNHABITAT
UN High Commissioner for Refugees (UNHCR)	UNHCR
UN HRD	UNHRD
UNICEF	UNICEF
UNPCT,	UNPCT
Rawalpindi-Islamabad Union of Journalists	UoJ
US Army	US Army
US Consulate Lahore	US Consulate
US Department of Defence (DoD)	US DoD
US Embassy	US Embassy
US Foreign Relations Committee	US FRC
US govt	US gov
US Military	US Military
US Navy	US Navy
US National Security Council	US NSC

US State Department	US State Dept
USAID	USAID
Ummah Welfare Trust (UK)	UWT
WAPDA	WAPDA
World Bank	WB
WFP	WFP
WHO	WHO
World Vision	WV
Federal Cabinet	Fed Cab

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