

Quantifying Social Capital in Disaster-prone Areas: A Comparative Study of Formal and Informal Settlements



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THESIS ACCEPTANCE CERTIFICATE

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DEDICATION

*This thesis is dedicated to my beloved parents, husband, and my two little monsters
for always being an unending source of love and encouragement.*

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All praises to the Allah Almighty, the merciful and the most beneficent who showers his blessings upon us every day. He beholds all the knowledge of the universe and beyond.

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Maheen Shahid

ABSTRACT

Today our society is paying a heavy price for its negligent approach towards the environment in the form of climate change. Global warming and natural disasters related to climate change have vastly increased in number. The ever-increasing natural hazards such as flooding, cyclones, drought, extreme weather events, etc., have become a dilemma that demands our utmost attention. Most of the research has been based on understanding hazards such as scales developed to measure seismic activity, wind speed, flood flow, etc., which has resulted in the formation of new materials and building techniques. Society as a whole has been ignored on all levels. The concept of self-mobilization of the community, i.e., making a community self-reliant, has held no importance at all. Social cohesion matters to community resilience because social ties in a community can offer a kind of communal insurance or capital where members can share information and resources, increasing the capacity of communities to respond to a crisis. The study carried out intends to quantify social capital in disaster-prone areas of formal and informal settlements. The study has been conducted in the formal and informal settlements of the city of Islamabad and Rawalpindi. The sample size 400 was calculated through Slovin's formula. Each settlement was assigned a sample of 100 respondents. Data was collected through a questionnaire survey. The indicators are identified through existing research and divided into four components: socio-economic characteristics, civic and political participation, network ties and trust, and consolidated and knowledge resources. Three out of four components have been quantified to measure social capital in disasters. Descriptive statistics, chi-square, and independent t-test have been used for analysis. A comparison of each component has been made between both settlements, and lastly, the overall social capital of both settlements is calculated. This is an index-based study. The quantification of dimensions of social capital shows that civic and political participation is the same in formal and informal settlements. Informal settlements have stronger social ties and networks and more trust in the community to help them in crisis, while formal settlements have more consolidated and knowledge resources. The overall social capital is greater in the informal settlements as well the correlation between actual and perceived social capital is also positive.

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CHAPTER 1

INTRODUCTION

1.1 Background

Every community at one point or another in history has confronted a disaster and survived as well. Despite all the adversities, they continue to grow and prosper. Most of these disasters are now left with a vague imprint on the memory. The important aspect to be observed from these disasters is not the recollection rather the part which focuses on how these traditional communities responded to these disasters and survived. In the past, the primary focus of the research regarding disaster prevention had been on policy development. Majority of the research has been based on the understanding of hazards such as scales developed to measure seismic activity, wind speed, flood flow, etc. It has resulted in the formation of new materials and building techniques. Recently, it has shifted towards the human population that is susceptible to these hazards due to a number of reasons. Some of these are building patterns, land-use, and haphazard growth. As a consequence, populations at risk have been identified. This has led to the emergence of communities that are disaster resilient. It is clear that the focus of these efforts has always been hazard identification, physical infrastructure, and redefining building codes repeatedly. The focus has always been on how disasters can be avoided or mitigated or what pattern the buildings should follow to become resilient. It is evident that little or no attention has been given to the social structure of the communities. Society as a whole has been ignored on all levels. The concept of self-mobilization of the community, i.e., making a community self-reliant, has held no importance at all. Hence, social resilience bears no significance. The possibility that a society or a modified societal structure can positively impact a disaster-struck community should be stressed upon.

Social capital is a concept that can be utilized in different phases of a disaster. For instance, it may provide us with insight into the response patterns of different communities. Previously, emphasis has been laid upon the importance of human capital for economic growth along with physical capital. For instance, the more educated and trained individuals are, the more will be the economic

growth. However, the hour of the need has reached beyond human capital. It is high time to grasp the importance of social capital, i.e., collective action and social cohesion based on social ties, relations, and networks. Current literature provides us with many evidences where social capital has been utilized in the assessment of collective action such as education and schooling, family issues, governance, democracy, development problems, etc. The vulnerability of individuals or communities against external threats, crisis or disasters cannot be eliminated by investing in physical capital alone. The solution lies in incorporating social capital to increase resilience in the pre-disaster phase and post-disaster recovery. It will not only enhance resilience but also the process of recovery. Community resilience can be defined as the combined capability of a community or an area demarcated geographically to cope with posed external threats or stressors and, through a combined effort, efficiently resume their daily routine of life after a disruption. (Aldrich, 2012)

Disaster scenarios usually call for trained personnel and rescue operations that are formal in nature. Literature shows that informal relations or ties such as neighbors or members of the community are usually the ones that act as immediate responders or first rescuers. Since neighbors are the closest and well aware, they become the first ones to offer assistance. Social capital leads to the formation of a social network and informal ties that become a major channel of various resources such as informational resource, first aid, support groups, childcare, etc. Despite its prominent effectiveness, it is still under-utilized in disaster research and has yet to be fully incorporated as an integral component in pre- and post-disaster scenarios. This study will review the social capital definition and highlight its significance in being integrated into disaster management by identifying and quantifying factors that influence social capital in a community. This research will develop empirical confirmation that social capital enhances disaster management and provides policy and recommendation that positively impacts disaster management through social capital.

1.2 Justification

There has been a vast amount of research carried out by scholars on social capital, its conceptualization, and how to measure it. Despite that, there remains a huge gap that needs to be filled. This gap poses the question of what interventions are to be invested in to lead to the improved social capital of a community. Therefore, it yet remains a task to clearly define social capital in terms of disaster and identify the means to measure it. Through literature, it has been

established that social ties, relations, and networks lead to collective action. This collective action, along with social cohesion, is major component in the face of a crisis. In the meantime, the question of how all members of the society can equally benefit from social cohesion and collective action still remains unanswered.

Predicting the scale, timing, intensity, and risk of stressors and shocks, cities are always at conflict. Whereas some communities practice mitigating the vulnerabilities and making the community resilient before the crisis hits. Risk management focuses on physical infrastructure strengthening, which only works if a city successfully avoids a shock. Social capital fulfills the benefits in all the phases of a disaster. Social cohesion matters to community resilience because social ties in a community can offer a kind of communal insurance or capital where members can share information and resources, increasing the capacity of communities to respond to a crisis. Several studies focus on social capital, its advantages, and impacts and strengthening social ties, etc. Most of this study focuses on qualitative research. These studies mainly highlight the impacts of social capital and derive policy and recommendations that increase social cohesion. In the face of any crisis or emergency that costs financial and human life losses, physical infrastructure is the center of focus of any research or policy. This research's purpose is to highlight the fact that social, not physical, and infrastructure drives resilience. This study will highlight the significant part of social capital and quantify factors influencing it.

In any crisis or disaster, several resources become accessible due to social capital, whether individual or community's. These resources can be versatile in nature, e.g., financial resources, first aid, child care, informational resources or support groups for emotional or psychological support, etc. Therefore, the community will become resilient through the strengthening of social ties and relations within the community.

The common practice of mitigating the disaster comprises enhancing the community resilience by investing in the physical infrastructure. The social infrastructure is often a derelict aspect in disaster risk reduction policies. Community resilience is influenced by its social connections. In case of an impending disaster, these connections should be utilized to access several resources such as monetary aid, physical assistance, informational resources, and emotional support.

1.3 Research Objectives

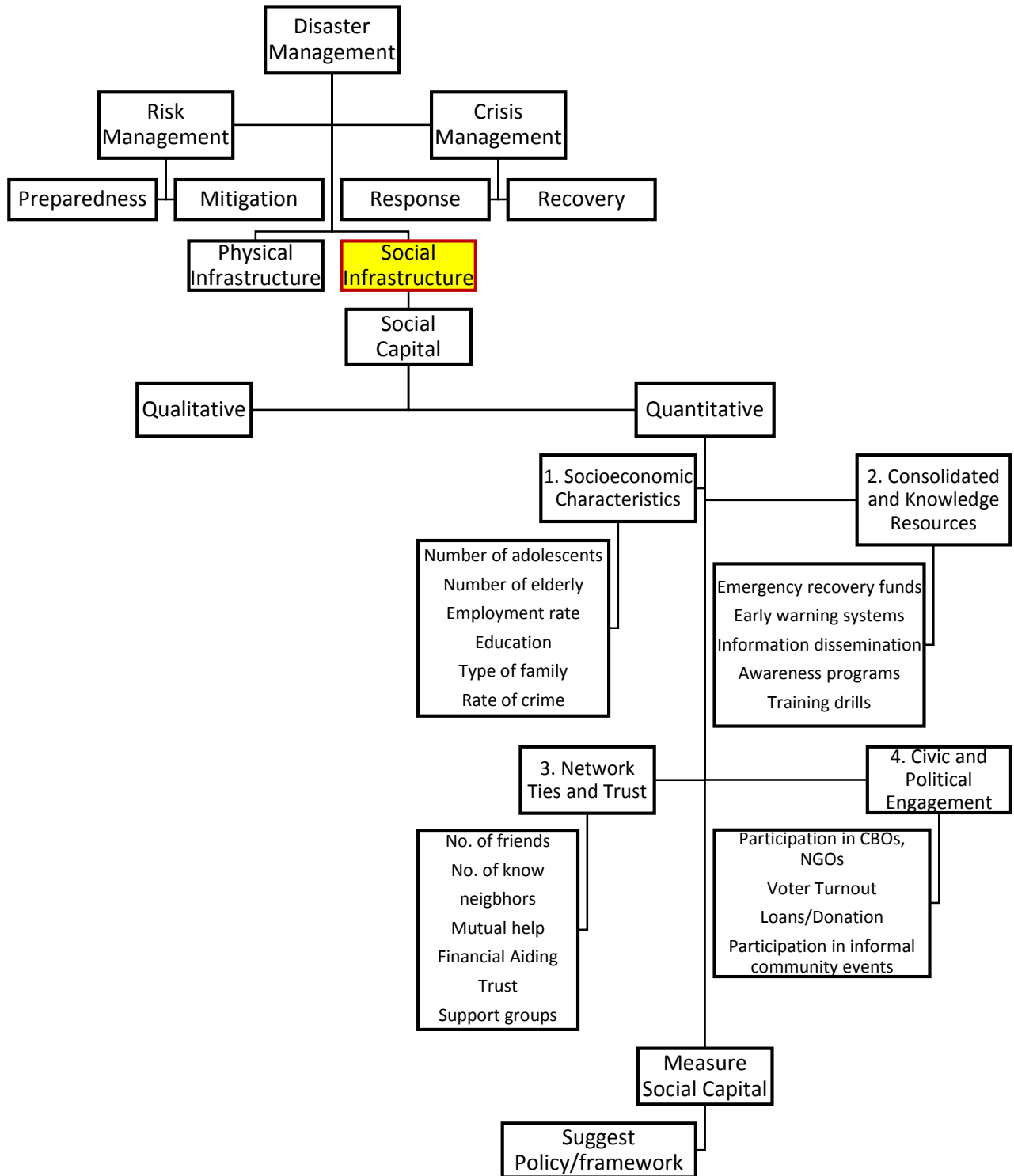
Following are the objectives regarding social capital and disaster to be fulfilled through this study:

1. To perform a systematic review of social capital in disasters through the PRISMA framework.
2. To construct social capital index against disaster/crisis.
3. To compare social capital amongst formal and informal settlements in the face of disasters.
4. To suggest policy/framework for incorporating social capital effectively to respond to emergency/crisis.

1.4 Scope

This study will highlight the significance of social capital as a primary tool to mobilize communities in case of crisis or disaster. It will focus on community connectedness and relation and their impact on social cohesion. It will help ascertain the factors that affect a community's social capital. Furthermore, it will help us construct quantifiable means to measure social capital in a community. The study will be carried out in neighborhoods of Islamabad and Rawalpindi, both planned and traditional grown cities of Pakistan. Data will be collected from the formal settlements and the informal settlements of the cities to map the comparison of social capital between the two developments in the face of a crisis or disaster.

1.5 Conceptual Framework



1.6 Summary

This chapter discusses disaster prevention techniques/methods being used repeatedly over the years with a high emphasis on physical infrastructure. It is now high time to shift the prevention or mitigation methods to something more productive and effective; social capital. Social infrastructure may now be the new or rather a better solution. Investing in social capital can profoundly affect the resilience of a community against a crisis or a disaster. Social ties, relations, and networks lead to collective action that leads to the self-mobilization of a community. This study helps first in identifying and then quantifying factors affecting social capital in a community. It measures the social capital of a household in a community and the impact of the collective capital of the community against a crisis.

CHAPTER 2

,LITERATURE REVIEW

2.1 Understanding the terms disaster, crisis, and emergency

The terms disaster, crisis, and emergency have variance in their nature. Nevertheless, they are closely connected, dependent, and often used interchangeably. Despite the existence of a fine line of difference among these terms, they are used in literature interchangeably with multiple combinations, for instance, 'emergency' and 'crisis' management, 'disaster emergency' or 'crisis emergency.'

2.2 Definitions of Disaster

On the basis of literature, a vast number of researchers have defined disaster based on its causes and effects. The UNISDR (United Nations Office for Disaster Risk Reduction) asserts that an amalgamation of vulnerabilities, hazards, and lack of means and measures defines a disaster where it becomes necessary to plan, coordinate, and utilize proper resources to diminish the adversarial effects of a disaster. Disasters are also defined as abrupt, unexpected event caused by social, natural, or technological factors that result in destruction and loss (Alexander, 2005). According to Cutter (2003), vast scale and highly adverse effects created by an event can be categorized as a disaster. Various scholars have also categorized disaster as an event that requires outside assistance and stakeholders to intervene as the inherent capacity to resist, manage and recover is overpowered (Guha-Sapir, 2014). Most of the definitions of disasters are formed based on space and time. For instance, a disaster occurs at a particular time in a particular space that has the society paralyzed due to destruction and loss (J. Wilson and Oyola-Yemaiel, 2001). According to the literature, there is no common definition of disaster used by scholars. The variances in the definition are cause and effect based and are impacted by various economic, political, and geographic factors of a country.

2.3 Definitions of crisis

A crisis is defined as an abnormal event that posed a threat to business and demanded instant policy alterations, and it takes hold of media and public scrutiny. It threatens the public's trust (I. H. S. Sawalha, 2003). Moreover, a crisis impairs the routine behaviors or procedures of a group, individual, or organization and abrupt change becomes the cause of stress (Booth, 1993). The key characteristics of a crisis are unpredictability and uncontrollability that impairs normal or routine procedures. It usually involves a small population or locality or a company facing serious issues.

2.4 Definitions of emergency

An emergency can be defined as destruction or loss caused by either natural or human-made factors that result in excessive damage to people or property (S. Shen & M. Shaw, 2004). An emergency is an event that poses impending or actual harm to the environment, people, or property and demands a rapid reaction. Emergencies are unexpected due to ambiguity about when and where they occur and to what extent the damage is caused, but they can be planned for as well (Alexander, 2005). It is also defined as a state of chaos, paralyzing the regular procedures and requiring tremendous measures to save people, restrict damages and return to normalcy (Alexander, 2003).

2.5 Cross-analysis of terminologies

Based on the definitions, the similarities and differences have been identified between disaster, crisis, and emergency. The characteristics of abrupt nature and damage are common among the three terms. A similar aspect of crisis and emergency is that they affect a small area or population. However, disaster and emergency differ vastly, although they have a common element of urgent relief and aid. The terms disaster and crisis have more in common such as both are uncontrollable, require abrupt policy changes, are unique in nature, have serious imposed risk, and cause system disruption. This clearly indicates that disaster and crisis are more similar in nature than an emergency. The two major differences between emergency and disaster are that an emergency event doesn't require changes in the system or procedures while the other does. Secondly, a disaster is an event that has already happened, whereas an emergency is an impending situation or an event.

2.6 Definitions of social capital

In 1916, Louis Hanifan defined social capital as a unit consisting of individuals or families with the attributes of mutual sympathy, camaraderie, good-will, and social interaction. Ever since there have been multiple disciplines that have embraced. This concept ascertains that an individual's or a group's participation and involvement can have a positive impact on a community. There are four main scholarly figures who have worked on the evolution of social capital's concept throughout the years. Pierre Bourdieu, redefined social capital. According to him, social capital is a component among four forms of capital, namely cultural, economic, and symbolic, and it assists in determining the trajectories of social life (Bourdieu, 1986). James S. Coleman, in 1998, explained social capital based on Bourdieu's principles. According to him, social capital and the social hierarchy of relationships can be utilized as tangible resources for the individuals or community (Coleman, 1988). Robert D. Putnam asserted that mutual benefit and cooperation are facilitated through networks, trust, and social norms (Putnam, 2000). Nan Lin in 1999 emphasized social capital through relationship networks. According to him, resources in a community can be accessed more efficiently through relationship ties and social networks (Lin N. , 2001).

2.7 Structural and cognitive dimensions

According to the literature, social capital has been divided into two dimensions; structural and cognitive. The structural dimension of social capital refers to an individual's or a group's action that can be recorded and observed objectively. Cognitive social capital can also be referred to as psychological or cultural social capital. The cognitive dimension of social capital is a subjective matter based on people's feelings or emotions to a certain person, concept, institution, etc., that affect mutual trust, civic values, and norms. It represents the cultural or psychological impacts too. Structural social capital is a quantitative dimension, whereas cognitive social capital is more qualitative. The latter concept is a measure of norms and social tradeoff or mutuality, while the former concept is a measure of social connections or network ties. Based on the literature, reciprocity and trust are affected by the structural component of social capital. Hence, it can be asserted that structural and cognitive social capital are no two different concepts but are interdependent on each other. For instance, the role of mutual trust is to strengthen social connections or relations. Different aspects of social capital have various roles in a community. It may bring about personal benefits to individuals with contacts or connections, and it may bring

about common good to a group of individuals with a strong social relation. Furthermore, it may instigate common benefits for the community as a whole as well. Cultural context also plays a vital role in determining the effect of social capital due to trust and equity. As a result, it may enhance the overall impacts of social capital. (Rossteutscher, 2008)

2.8 Forms of Social Capital

Based on existing research, the scholars divide social capital into three categories: bonding, bridging, and linking (Aldrich, 2012). Each form of social capital is based on the configuration of the network and the strength of connections or social ties. Every type has its own significance and impact on individuals or the community.

A social network based on emotional closeness among individuals, e.g., friends or family, is called bonding social capital. This type results in strong ties among members of a particular group. The characteristics of bonding social capital are based on levels of similarity in terms of attitude, demographic factors, resources, and information. (M. McPherson, Smith-Lovin, & J. M Cook, 2001). This type is generally effective in providing personal aid or assistance and support through strong ties or connections. Bridging social capital characterizes weak ties among individuals with heterogeneous characteristics in groups, for instance, ethnicity or class. This type consists of demographic variance and helps provide resources and information that results in community's advancement. Bridging capital is created through participation in organizations such as political institutions and civic engagements, parent-teacher relationships, interest clubs, education groups, religious organizations, etc. The third type of social capital, linking, refers to a network that connects individuals to people in power or authority. This particular type is based on respect and trust among networks as common people are the ones who interact across the formal, explicit, institutional authority and power gradients in the society. For instance, almost no one among the village of Tamil Nadu, India, had been in connection at any level with a government official. Only a few had met a collector. Only due to this connection they succeeded in receiving disaster aid following Indian Ocean Tsunami. (Aldrich, 2012b)

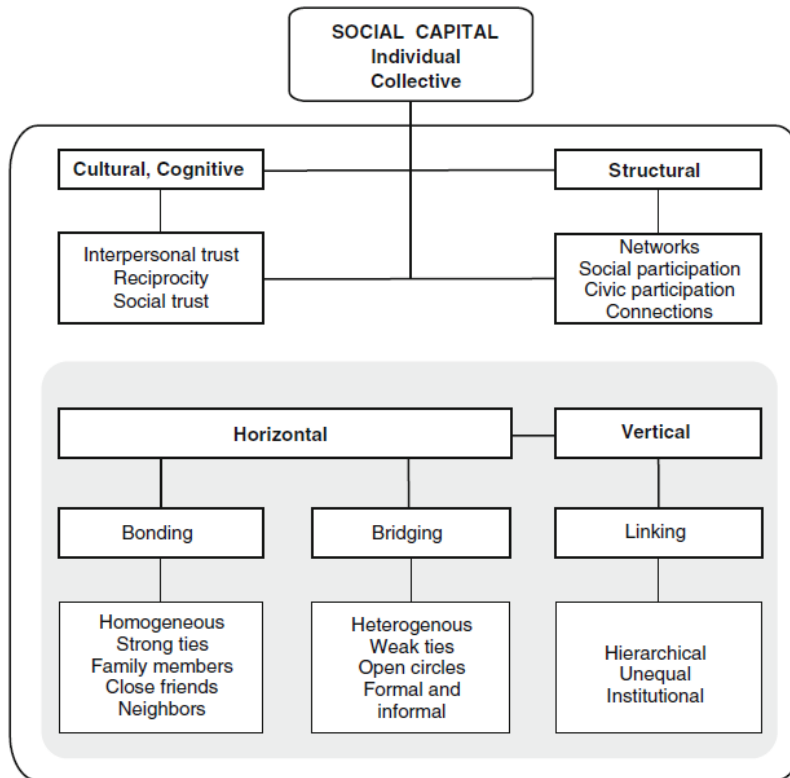


Figure 1: Dimensions and types of social capital and list of indicators

Source: Chapter 2, Healthy ties, Markku T. Hyypä

2.9 Social Capital and Disaster Management

According to the literature, the term pre-disaster planning came into existence in the 1960s after the world became familiar with the threats disasters posed (UN-ISDR, 2014). When people started grasping the concept that the catastrophes and destruction caused by these disasters can be alleviated, disaster management took a paradigm shift. Previously, the focus had been overcoming the vulnerability and coping up with the consequences resulting from the crisis now. The approach was oriented towards relief. An approach that was more proactive in nature became a key component of disaster risk reduction. It is be noted that the calamities caused by a disaster have several long-lasting impacts. It not only affects physical infrastructure or economy, but the social infrastructure is shook as well. At the beginning of the 1990s, the engineered-oriented approach had been an integral component of reduction of disaster risk (J. Mimaki, R.Shaw, 2007). For instance, building levees to mitigate flood damages, upgrading building laws and codes to enhance resistance against earthquakes. The significance of social capital with respect to the disaster has

always been overlooked. Even today, in most countries, the primary focus is the engineering aspect, while the social aspect is non-existent as part of whole disaster management. For instance, in 1995, an earthquake struck Kobe, and it was observed that the people who showed up for primary aid and immediate rescue were not the professional teams but the neighbors (Y.Nakagawa, R.Shaw, 2005). Members of the community were the ones who save most of the population. Therefore, to reduce the risk of disaster for the community, special consideration is due to the social strata.

Instead of the role of higher government officials in disaster management, it is the involvement of local government and the community itself that plays a pivotal role. Local government and institutions are the key components in reducing disaster risk for individuals in recurring disasters. However, this school of thought has been losing its significance and effectiveness. The social aspect significance was brought under scrutiny through IDNDR (Inter- national Decade for Natural Disaster) from 1990-99. Through the Hyogo Framework of UNDR, it was made clear that all efforts are useless if all the capacities at all levels are not strengthened and developed. It is necessary to make the participation of the community a priority in order to reduce the risk of hazards to increase resistance (UN-ISDR, 2014). According to Sendai Framework (UN-ISDR, 2015), individuals are now more aware of the risk posed, which has decreased their vulnerability. Although this has created the emergence of new risks, but the disaster-caused losses have reduced considerably at community and local levels. Sendai Framework (SFDRR) primary principle is to identify the risk drivers at a local scale and empowering of individuals and local communities as a chief component to reduce the risk posed by the disasters. Hence, the significance of the role of the community and individuals is brought under scrutiny. Foremost tasks include increasing cooperation among individuals in the community and enhancing their collaboration, information dissemination pertaining to disaster risk, identifying and forming plans for reducing risk at a local scale, empowering individuals and community to enhance their capacity and ability (UN-ISDR, 2015). Thus it can be established that SFDRR gives significant consideration to communities and individuals for reducing the risk posed by the disasters.

Disaster affects all kinds of capital; economic, physical, human, but the least affected is the social capital. Several studies have emphasized the significant role of social capital and social networks in disaster management. In case of crisis, social networks can be useful not only for monetary

assistance but also non-monetary aid such as damaged property repair, donation of material goods, assistance in rescue, provision of shelter, emotional or mental support, child care, and information dissemination, etc. Civic associations and social ties are considered pivotal factors in response to disasters. Therefore, it can be asserted that social capital is one of the key components of disaster management. After the paradigm shift of the reactive approach, the benefits of social capital can be acquired more viably.

2.10 Social Capital and Disaster Recovery

There is several qualitative research done on damage-based and standard resource approaches to disaster recovery. These studies have highlighted a significant potential for the role of social capital from the resources facilitating collective action in communities to swift recovery in disaster scenarios (Y.Nakagawa, R.Shaw, 2005). For instance, individuals with strong ties in the community have higher chances of recovery after a crisis. Based on studies, it can be established that resilience is positively affected by social capital as it provides enhanced sources of information to the victims at a critical time. For instance, after World War II, the Japanese states that had a strongly connected society in terms of communication had a higher recovery rate (Kage, Making reconstruction work: civil society and information after war's end, 2010). There have been two identified mechanisms that ensure faster disaster recovery in communities or areas with strong or dense networks or social associations. First, victims have access to available resources, e.g., physical, financial, and logistic, through support networks (Beggs J., V. Haines, and J. Hurlbert, 1996). For example, information regarding the services to be provided to the survivors is an important part of their decision process, therefore shaping their actions. Thus it can be established that the strength of the social structure of connections is essential in the provision of administrative assistance and guidance and financial and informational resources (Granovetter, 1973). The second mechanism refers to the communities that participate in politics or are active politically and have strong ties and more mobilization chances. They can put forward their needs to authorities and demand resources more effectively by breaking the barriers through combined action (Olson, 1965). Neighbors that have a greater level of trust often share political or bureaucratic information. They may guard public property to prevent littering or waste dumping and prevent pillage in their community. After the 1995 earthquake in Kobe, government officials announced rehabilitation through rebuilding the plans but the residents agreed to live in shared housing to pool resources

(R. Olshansky, L. Johnson and K. Topping, 2005). Higher social capital helps the community to attract and control more resources. The individuals or communities that have more cooperation have more easy access to supplies, goods, loans, and resources essential for their rehabilitation. On the contrary, individuals with weak ties within the community may involve themselves in disruptive and illegal acts that hinder the recovery process (Varshney, 2001). Moreover, a strong social structure will empower the citizens or individuals to raise their voice and demand resources from the authorities and work with cooperation to remove hindrances to recovery (Hirschman, 1970). The residents of a community with everything at stake in case recovery are not successful since the local residents in a community with high social capital are deeply rooted in the locality. One of the impended responses to a crisis is an exit; to leave, start anew. The community with strong ties becomes an obstruction to exit, and thus, individuals find themselves working towards a solution other than leaving.

2.11 Case Studies

In this section, the case studies will be discussed with respect to the types of social capital.

Study shows that greater levels of bonding capital will in return increase the common norms and values and level of trust in a community. The Kobe and Gujarat earthquake study by Nakagawa and Shaw provides evidence that participation, networks, norms, and high trust were acting as catalysts to quickly recover from the disaster (Y.Nakagawa, R.Shaw, 2005). Despite the heterogeneity in economic and cultural aspects in the communities, they went through faster recovery because of highly satisfactory leadership heading rebuilding and high social capital. Dependence and reciprocal trust were key factors in enabling increased levels of outcomes against disaster, volunteering, and responsibilities that, in the long run, enhance the preparedness of disaster.

Another study investigated a Vietnamese community located in New Orleans that was heavily flooded in Hurricane Katrina. It was a low-income, immigrant community- a village named L'Est. It had a faster recovery rate and were able to rebuild efficiently compared to the richer and less affected neighborhood. The primary factor for recovery was bonding social capital and the involvement of the church in the village. The church's role was too of significance as it formed cooperation among the affected to share food ad goods and stood staunch in playing its role as a political actor against external authorities forcing new building and zoning laws (Chamlee-Wright,

2006). A growing body of research also provides evidence for bridging social capital for enabling faster recovery following disasters. Bridging capital plays the same role in disasters as in daily life. It increases the accessibility of information and opportunities to provide resources and assists in recovery. It was disclosed in a study that after Hurricane Andrew, individuals who participated in social groups were provided with more support in recovery (Haines, V. A., Hurlbert, J. S., & Beggs, J. J., 1996). Bridging capital played a pivotal role in enhancing the resilience of a Vietnamese community, Mary Queen, through charity conducted by organizations both local and national. It led to the pooling of resources and commercial collaboration, between residents and business organizations that resulted in the provision of labor and resources (C. A. Airriess, 2008). In pre-World War II, strong resilience was provided through non-profit groups and voluntary associations after the massive destruction caused by the war. Almost forty-seven counties faced difficulty in rebuilding communities, schools, and institutions, etc., while the communities that had higher levels of bridging capital recovered more effectively (Kage, 2011). Aldrich (2012a), in a study of the 1925 Japan earthquake, found out that a number of gatherings pertain to politics and voter turnouts were far better indicators than population density, amount of damage, or economic indicators to measure population growth. Social associations, clubs, and NGOs also play a vital role in post-disaster recovery (Aldrich, 2012b).

Both bonding and bridging capitals are distinct in nature but are complementary to each other. They are effective in every phase of a disaster, but usually, a community will never show equal trends for both types. One may always be less or more than the other. A study was conducted by Elliot (J. Elliott, T. Haney & P. Sams-Abiodun, 2010) between two different neighborhoods. The first neighborhood was a low-income African-American community, Ninth Ward, while the other was a high-income, white-majority community situated in New Orleans. During hurricane Katrina, the Ninth Ward resident's primary support was through bonding capital. It was observed a year after the disaster that the overall support they had gained comprised of minimum shelter and little provision from network ties. This was due to their lack of communication and weak or no ties with the outside communities. The residents of Ninth Ward kept themselves disconnected from the external neighborhoods. Their priority had been building a connection with individuals within the community, promising resources. This had affected their resilience, and therefore, it took them more time to recover than the affluent community. Hawkins and Maurer (Maurer, R. L. & Hawkins, K., 2010) investigated the role of bonding and bridging capital in hurricane Katrina

through interviews with the hurricane survivors. They learned that friends, family, and neighbors were pivotal in providing first aid or carrying out rescue operations, but the role of external communities was also essential as outer networks became a source of goods, resources, information, and supplies required for recovery from the disaster. Another study concluded that the higher level of trust in communities meant better preparedness measures against disaster where membership of organizations (bridging) had no impact (Reininger, 2013).

Linking social capital plays its role when individuals use their connections with people or institutions in power for recovery. During a typhoon, the Gunma (Japan) residents, with the help of government officials, utilized their connections to alert the community about the impending hazard (N. Hishida & R. Shaw, 2014). In Shimokawag Uchiura (Japan), in case of a prevailing disaster, the locals took the initiative. They contacted local officials, conducted training, formed teams of fire fighters, created norms, and survived the impending disaster more efficiently than other neighborhoods. According to the literature, linking social capital can also assist in speeding up disaster recovery. In the Gujarat earthquake, the individuals who had stronger linkages with influential personalities recovered more efficiently than those who did not (Y. Nakagawa, R. Shaw, 2005). Similarly, when Tamil Nadu suffered from Indian Ocean Tsunami, the victims trusted their government to get them out of the crisis and recovered effectively. The role of linking capital is essential for implementing policies.

The imbalance between bonding, bridging, and linking capital can lead to problematic trade-offs. If a community has a greater value of bonding and linking social capital but less bridging capital. It will lead to unequal distribution of resources and will result in disparities among the community's recovery statuses. For instance, after Tsunami, the hamlets located on coasts in the southern region of Tamil Nadu were provided with more aid and resources from the government and the NGOs (Aldrich, 2012b). This was due to higher levels of both bonding and linking social capital that the community recovered sooner and had a greater number of rebuilt and new homes while the villages that were entirely dependent on bonding capital face obstacles in securing assistance and aid. These particular villages had only a few resources and had no option but to stay in shelters for a long time. This was due to their sole reliance on bonding social capital and zero communication with the external communities' sources of assistance. Therefore, it can be concluded that despite its significance, bonding capital becomes a cause of limitation to resources,

albeit may be a key factor for immediate aid or rescue operations in case of a disaster. Bridging or linking social capital is necessary to complement bonding capital as all locals in an affected community may be able to help each other out to a certain extent. However, when it comes to unhindered support, bridging and linking capital are necessary as the external communities or actors are unaffected by that particular crisis and fail to provide effective recovery resources.

2.12 Summary

The terms crisis, disaster, and emergency are dependent, overlapping, and often used interchangeably. However, based on literature, crisis and disaster are the terminologies that have more in common and can be used alternatively. While the definition of emergency makes it distinct from the other two concepts. Social capital definitions have four schools based on scholarly research. It comprises of two dimensions structural and cognitive. The former consists of the hierarchy of networks, while the other comprises of norms, values, and trust. It is further divided into three types bonding, bridging, and linking. Bonding consists of an immediate or closest circle of social connections, e.g., friends, family neighbors. Bridging results from the social connections by participation in political, civic organizations, social groups, and voluntary associations. Linking capital is formed through connections with an authority such as government or NGOs etc. Each form of social capital has its own significance in every phase of disaster management. Through literature, it has been established that to achieve the positive benefits of social capital. There must be a balance between bonding and bridging social capitals and linking capital.

CHAPTER 3

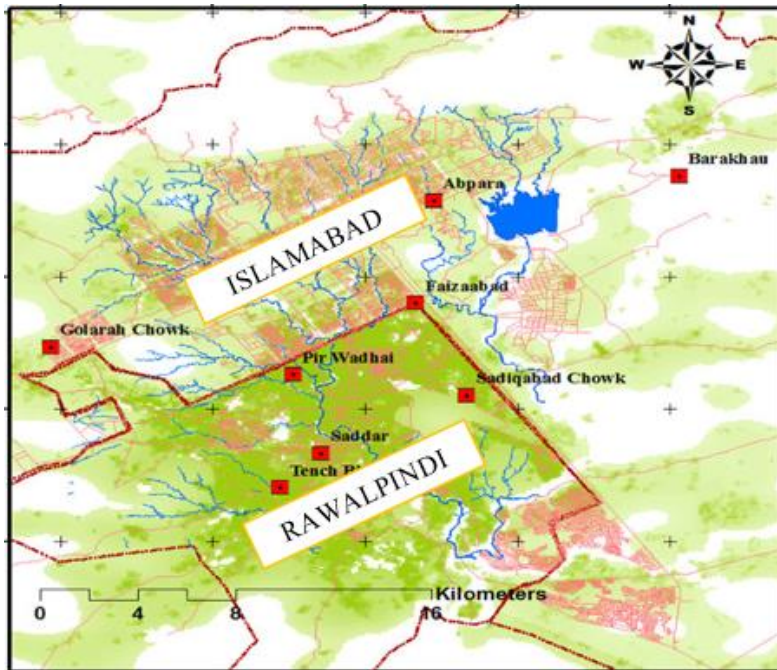
RESEARCH METHODOLOGY

3.1 Research Design

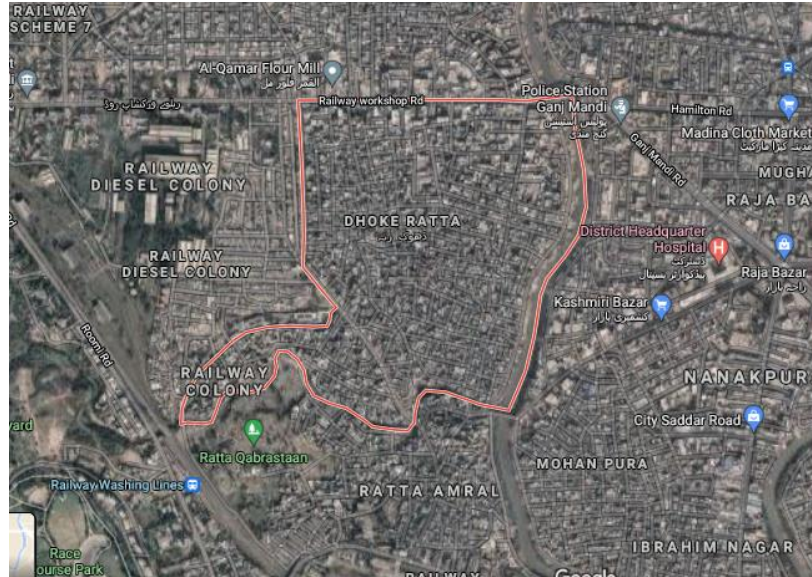
The research intends to quantify social capital in a hazard or disaster-prone areas. A number of studies have been carried out on social capital. Most work done is based on qualitative analysis. Only a few studies have discussed and analyzed social capital with respect to disaster management in the quantitative method. This study focuses on households and their collective capacity that influences social capital in a community. The quantification will be applied by developing an index for measuring social capital in a hazard-prone community.

3.2 Study area selection

The research is supposed to quantify social capital in disaster-prone areas and is carried out micro between formal and informal settlements. The macro analysis has been conducted between Islamabad and Rawalpindi. Islamabad is the capital of Pakistan and the only planned city in the country, whereas Rawalpindi is one of the oldest cities in the country and the third-largest city in Punjab Province. It is also considered to be one of the commercial and industrial hubs of the province. Two neighborhoods in Islamabad have been selected, i.e., sector I-9 and I-10, which are formal settlements in nature, and Eisa Nagri which is classified as an informal settlement or a slum. Similarly, in Rawalpindi, the neighborhood of Satellite Town has been selected to carry out the research as it is one of the oldest formal settlements in the city, and Dhoke Ratta has opted as an informal settlement in the city. One of the chief criteria of selection of these neighborhoods was that these neighborhoods should have experienced a disaster in the past at least once. Therefore, all the four neighborhoods that have been selected lie along with the Nullah Lai, which has been a cause of flooding in the past several times. Moreover, these neighborhoods also lie in the seismic hazard zone, therefore, are prone to earthquakes too.







3.3 Designing Survey Sample

The sample size is an important feature of any empirical study in which the goal is to make inferences about a population from a sample. A large sample size generally leads to increase precision when estimating unknown parameters, but it would be too expensive and a waste of time and effort, where a smaller sample size would save time and effort over accuracy. Therefore, between these two extremes lies the most efficient sample size for the given study objective.

The sample size was calculated using the following statistical formula:

Slovin's formula:
$$n = \frac{N}{1+Ne^2}$$

where,

n: is the sample size

N: is the size of the population

e: margin of error

According to the census of 2017, the total population of Rawalpindi city is 3,258,547 and population of Islamabad is 1,014,825. With a 95% confidence level the Slovin's formula gave a sample size of 400 for. For surveying purpose, this sample size was equally divided between both cities i.e., 200 samples for Islamabad and 200 samples for Rawalpindi. Furthermore, for the

analysis between formal and informal settlements, a sample size of 100 each was assigned to all four areas; Eisa Nagri, Dhoke Ratta, Satellite Town and I-9/I-10.

3.4 Questionnaire Design and Data Collection

The questionnaire has been designed in four segments, each based on the dimensions consisting of the pre-defined indicators; socio-economic characteristics, civic and political participation, network ties and trust, and consolidated and knowledge resources. The questions in socio-economic characteristics are both close-ended and Likert scaled. The dimension of civic and political participation comprises close-ended, numeric, and Likert scale questions. In network ties and trust, the questions are numeric in nature and Likert scale. The consolidated and knowledge resources have both Likert scale and close-ended questions.

The data has been accumulated through a questionnaire survey. The data has been physically collected through a household survey. All of the four neighborhoods have had a minimum of 100 respondents who answered the questions. A total number of 425 questionnaires were answered in the survey out of which 400 were accepted for the analysis while the rest 25 were discarded on the basis of incomplete data.

3.5 Indicators of social capital

Following is the list of indicators.

DIMENSIONS	UNITS	REFERENCES
CIVIC AND POLITICAL PARTICIPATION		
1. Level of participation in Community Based Organizations, Non-governmental Organizations, and Religious Organizations.	1-5 (Likert Scale)	How Social Ties Influence Hurricane Evacuation Behavior, Daniel P. Aldrich
2. Participation in informal community events (training, awareness programs, etc.)	1-5 (Likert Scale)	How Social Ties Influence Hurricane Evacuation Behavior, Daniel P. Aldrich
3. Participation in a community project related to disaster (provision of sandbags, planting riverside grass/trees, damage repair, etc.)	1-5 (Likert Scale)	How Social Ties Influence Hurricane Evacuation Behavior, Daniel P. Aldrich

4. Interaction/meeting with political personality.	1-5 (Likert Scale)	Local politicians as linking social capital: an empirical test of political behavior after Japan's 3/11 disasters. Daniel P. Aldrich, Yoshikuni Ono
5. Participation in political events regarding decision making.	1-5 (Likert Scale)	How Social Ties Influence Hurricane Evacuation Behavior , Daniel P. Aldrich
6. Did you vote in the last election?	Yes/No	Social Capital and Community Resilience, Daniel P. Aldrich and Michelle A. Meyer
Number of eligible voters in your house.	Numeric	Social Capital and Community Resilience, Daniel P. Aldrich and Michelle A. Meyer
7. Helped a community member with skill.		
8. Provision of a loan by any Community Based Organizations or Non-governmental Organizations after a disaster.	1-5 (Likert Scale)	Social Capital and Community Resilience, Daniel P. Aldrich and Michelle A. Meyer
9. Adding to the funds for damage repair of a public/community place after a disaster.	1-5 (Likert Scale)	Local politicians as linking social capital: an empirical test of political behavior after Japan's 3/11 disasters. Daniel P. Aldrich, Yoshikuni Ono
10. Donation of goods or other material things.	1-5 (Likert Scale)	Social Capital and Community Resilience, Daniel P. Aldrich and Michelle A. Meyer
11. Donation of money/financial aid.	1-5 (Likert Scale)	Social capital as a shield against anxiety among displaced residents from Fukushima Keiko Iwasaki, <i>University of Tokyo</i> . Yasuyuki Sawada. Daniel P Aldrich, <i>Northeastern University</i>
12. Rescuing or physically helping someone.	1-5 (Likert Scale)	Social capital as a shield against anxiety among displaced residents from Fukushima Keiko Iwasaki, <i>University of Tokyo</i> . Yasuyuki Sawada. Daniel P Aldrich, <i>Northeastern University</i>
NETWORK TIES AND TRUST		
1. Number of close/reliable friends.	Numeric	How Social Ties Influence Hurricane Evacuation Behavior, Daniel P. Aldrich
2. Number of friends on social media (Facebook, Twitter, Instagram etc.)	Numeric	How Social Ties Influence Hurricane Evacuation Behavior, Daniel P. Aldrich

3. Number of known neighbors.	Numeric	Social capital as a shield against anxiety among displaced residents from Fukushima Keiko Iwasaki, <i>University of Tokyo</i> . Yasuyuki Sawada. Daniel P Aldrich, <i>Northeastern University</i>
4. Trust in family in case of disaster.	1-5 (Likert Scale)	Qualities and indicators for social capital assessment. Rudolfs Cimmins, Peteris Skinkis, Maija Usca
5. Trust in Neighbor in case of disaster.	1-5 (Likert Scale)	Social capital for disaster risk reduction and management with empirical evidences from Sundarbans of India. Saswata Sanyal, Jayant K.Routray
6. Trust in institutions in case of disaster.	1-5 (Likert Scale)	Qualities and indicators for social capital assessment. Rudolfs Cimmins, Peteris Skinkis, Maija Usca
7. Trust in NGOs/CBOs/political parties in case of disaster.	1-5 (Likert Scale)	Qualities and indicators for social capital assessment. Rudolfs Cimmins, Peteris Skinkis, Maija Usca
8. Familial support in disaster.	1-5 (Likert Scale)	Social capital as a shield against anxiety among displaced residents from Fukushima Keiko Iwasaki, <i>University of Tokyo</i> . Yasuyuki Sawada. Daniel P Aldrich, <i>Northeastern University</i>
9. Neighbor's support.	1-5 (Likert Scale)	Social capital's role in recovery: evidence from communities affected by the 2010 Pakistan floods. Mohd. Sadiq Akber
10. Community support in disaster.	1-5 (Likert Scale)	Social capital for disaster risk reduction and management with empirical evidences from Sundarbans of India. Saswata Sanyal, Jayant K.Routray
11. Provision of financial aid by neighbor/institution/CBOs/NGOs.	1-5 (Likert Scale)	Social capital as a shield against anxiety among displaced residents from Fukushima Keiko Iwasaki, <i>University of Tokyo</i> . Yasuyuki Sawada. Daniel P Aldrich, <i>Northeastern University</i>
12. Seeking help from network/community when stressed.	1-5 (Likert Scale)	Social capital as a shield against anxiety among displaced residents from Fukushima Keiko Iwasaki, <i>University of Tokyo</i> . Yasuyuki Sawada. Daniel P Aldrich, <i>Northeastern University</i>

13. Entertaining visitors in your house.	1-5 (Likert Scale)	Indicators of social capital: Social capital as the product of local Interactive learning processes. Ian Falk & Lesley Harrison
14. Visiting the sick or housebound.	1-5 (Likert Scale)	Indicators of social capital: Social capital as the product of local Interactive learning processes. Ian Falk & Lesley Harrison
15. Exchange of gifts/cards.	1-5 (Likert Scale)	Indicators of social capital: Social capital as the product of local Interactive learning processes. Ian Falk & Lesley Harrison
16. Response to community members' query.	1-5 (Likert Scale)	Indicators of social capital: Social capital as the product of local Interactive learning processes. Ian Falk & Lesley Harrison
17. Relation of household members with neighbors/community.	1-5 (Likert Scale)	Indicators of social capital: Social capital as the product of local Interactive learning processes. Ian Falk & Lesley Harrison
18. Culture of Social Capital in the community.	1-5 (Likert Scale)	Social capital for disaster risk reduction and management with empirical evidences from Sundarbans of India. Saswata Sanyal, Jayant K.Routray
SOCIOECONOMIC CHARACTERISTICS		
1. Number of elderly in your household.	Numeric	How Social Ties Influence Hurricane Evacuation Behavior , Daniel P. Aldrich
2. Number of males/females employed.	Numeric	Social, not physical, infrastructure: the critical role of civil society after the 1923 Tokyo earthquake. D. Aldrich
3. Job/Business in neighborhood vicinity.	Yes/No	Social, not physical, infrastructure: the critical role of civil society after the 1923 Tokyo earthquake. D. Aldrich
4. Number of members of the family.	Numeric	Social capital's role in recovery: evidence from communities affected by the 2010 Pakistan floods. Mohd. Sadiq Akber
5. Type of family in your house.	Nuclear/ Joint	Social capital's role in recovery: evidence from communities affected by the 2010 Pakistan floods. Mohd. Sadiq Akber
6. Number of educated members in the household	Numeric	Social capital as a shield against anxiety among displaced residents from Fukushima Keiko Iwasaki,

		<i>University of Tokyo.</i> Yasuyuki Sawada. Daniel P Aldrich, <i>Northeastern University</i>
7. How long have you been living in your community? 8. Experience of a past disaster. 9. Perception of disaster risk	Numeric	Social capital's role in recovery: evidence from communities affected by the 2010 Pakistan floods. Mohd. Sadiq Akber
CONSOLIDATED AND KNOWLEDGE RESOURCES		
1. Emergency Recovery Funds.	1-5 (Likert Scale)	How Social Ties Influence Hurricane Evacuation Behavior, Daniel P. Aldrich
2. What are the main sources of information dissemination?	TV Radio Internet Radio Social - Media Newspaper Banners Pamphlets	How Social Ties Influence Hurricane Evacuation Behavior, Daniel P. Aldrich
3. Early warning systems.	1-5 (Likert Scale)	Social capital for disaster risk reduction and management with empirical evidences from Sundarbans of India. Saswata Sanyal, Jayant K.Routray
Participation in emergency/crisis training drills/programs.	1-5 (Likert Scale)	Social capital for disaster risk reduction and management with empirical evidences from Sundarbans of India. Saswata Sanyal, Jayant K.Routray
4. Disaster awareness programs.	1-5 (Likert Scale)	Social Capital and Community Resilience, Daniel P. Aldrich and Michelle A. Meyer
5. Personal support groups.	1-5 (Likert Scale)	Local politicians as linking social capital: an empirical test of political behavior after Japan's 3/11 disasters. Daniel P. Aldrich, Yoshikuni Ono
6. Evacuation center or Emergency Shelter Assistance. 7. Evacuation plan/route.	Yes/No	Social, not physical, infrastructure: the critical role of civil society after the 1923 Tokyo earthquake. D. Aldrich

Table 1 List of indicators

3.6 Data Analysis methods

The data analysis has been performed on four clusters of data. Two of the four clusters belong to the formal settlements, while the other two belong to the informal settlements. A statistical software (SPSS) has been utilized for data entry; descriptive statistics have been performed on individual dimensions to calculate its value. Later, the average of the four dimensions of the indicators has been applied to calculate the value of social capital in each settlement. The index has been developed by performing descriptive statistics (percentages, frequencies, mean and standard deviation). Further tests such as chi-square, independent t-test, and Pearson correlation have been applied to calculate the difference in social capital among the formal and informal settlements.

3.6.1 Disaster Profile of Study Areas

Nullah Lai is one of the major drainage lines of the city and poses a major threat to it. It typically contains the surface rainwater runoff and channels throughout Islamabad and Rawalpindi, and now it is also considered a waste dumping site for the city's urban waste. This nullah is considered a hazard to the city's population in terms of flooding during the monsoon period. It also makes the city's population susceptible to environmental hazards. Rawalpindi is also vulnerable to earthquakes posed by earthquakes because it lies very close to Islamabad, which is considered a seismic zone. Furthermore, it is also known to be under the impact of various health hazards in the form of epidemics.

One of the prime reasons for the posed hazard by the nullah is that approximately 40% of the area of the catchment of the nullah lies within the residential zone (NACA, 2013). These housing units are encroachments, and because of their haphazard placement, it becomes hard to identify the nullah's boundaries. Due to their dangerous proximity to the nullah, they become extremely vulnerable to hazards, namely flooding, especially during the monsoon period. There have been 19 recorded floods that have occurred from 1944 to 2002, among which the most destructive has been the July flood in 2001, and it was declared a disaster (NACA, 2013). That flood had caused immense damage to both private and public property and infrastructure as well. The destruction caused by the disaster was due to both natural and human made reasons. The human made causes

include the nonexistence of laws of zoning and the extreme negligence in arrangements for which the authorities were accountable for.

Environmental degradation is another hazard making the area susceptible. Only a small percentage of the city's waste water is processed and discarded. The rest of the waste flows unhindered and unfiltered in open drains and eventually channels into the Nullah Lai. This leads to several degradation problems such as degradation of soil, contamination of soil water, etc. The industrial waste also aggravates the problem as there is no formal processing of the waste (NACA, 2013).

3.6.2 Earthquake

Rawalpindi is also known as a twin or sister city of Islamabad. As Islamabad is considered a seismic zone and lies in the vicinity of the Rawat faultline, Rawalpindi is also affected by the earthquakes that hit Islamabad (NACA, 2013). Despite being more distant from the faultline than Islamabad, the population of Rawalpindi is considered more prone to earthquake shocks because of two main factors. First, Rawalpindi is an old city. It is not planned. Most of the areas are terribly congested and densely populated. The buildings are old and unmaintained and are connected by narrow walkways. Second is the absence of building codes and laws. There has been no incorporation of new building standards and codes, and the existing codes are so outdated that they fail to ensure the safety of their occupants.

3.6.3 Other Hazards

Urban fire has been a hazard in the city too. Mainly due to the aforementioned outdated building standards and codes. Moreover, some political unrest in the past has led to riots that made a few buildings catch fire and eventually resulted in an uncontrollable fire in the commercial areas of the city. No building safety laws have been implemented, such as the installation of fire alarms, etc., dengue's epidemic has been impacting both urban and rural areas of the country. In Rawalpindi, it has become a yearly occurrence, and it has been reported to be increased by 2013 drastically (NACA, 2013).

CHAPTER 4

Systematic Review of Social Capital in Disasters through PRISMA Framework

4.1 Introduction

Humans must be prepared for a disaster as they can occur anytime, anywhere, overcoming the capacities of existing resources. The intervening human activities with the natural phenomenon have made humans vulnerable to disasters and hazards, which resulted in 6270 recorded disasters from 2006 – 2015, making the death toll reach 8 million and the economic loss of about USD 19 trillion (Aghaei, Seyedin, & Sanaeinasab, 2018). Flooding is the most faced disaster claiming almost half of the effects of all disasters. Floods shall upsurge the no. of diseases, deaths, and major disruptions in socioeconomic conditions (Alderman, 2012).

For earthquakes, most of the metropolitan cities in the world lack the basic necessities for urban earthquake management, making them exposed to disaster (Kangi, 2015). The respective authorities and city municipalities are left with poor efficiency over the administration, as in the case of the Big Quake of Japan, 2011 (Kudo, 2014). Although social networks have an impending advantage upon the resilience of the locality (Umihara, 2013), however, these disasters sometimes question the way community infrastructure distributes information, describing it as “Punctuated Equilibrium” (Erin et al., 2017).

4.2 Social Capital and Disaster Management

Today there are several examples where the primary focus is the engineering aspect for disaster prevention and mitigation, while the social aspect is non-existent as part of whole disaster management. For instance, in 1995, an earthquake struck Kobe, and it was observed that the people who showed up for primary aid and immediate rescue were not the professional teams but the neighbors (Y.Nakagawa, R.Shaw, 2005). Members of the community were the ones who save most of the population. Therefore, to reduce the risk of disaster for the community, special consideration is due to the social strata.

Some of the key factors that determine an individual's survival and coping with the effects of a disaster is the social network, relations, or connections. There are several studies that support the argument that network ties play a significant role in the recovery of the community. The stronger the ties, the quicker the recovery, whereas weak ties are associated with several obstacles to recovery as well as a source of stress, anxiety, and cognitive denial. The resilience of an individual or a community may be measured through the support and strength of their social connections and the institutions on which they rely upon. There have been two main categories identified that offer strength, resources, and support through the social links to a disaster-struck community and enhance the resilience of the community. One is the monetary resources such as financial aid etc. The second will be the nonmonetary aid such as rescue, sheltering, emotional support, information, etc. there are numerous studies that provide us with evidence to the concept of social capital's significance in disaster management.

4.3 Methodology

In this study, meta-analysis or scoping review technique has been opted to identify the privation and gaps in the research field of Social Capital in Disaster. The keywords of "Disasters and Social Capital" were searched in Web of Science, and the results gave a total of 102 potentially relevant references. After applying filters of time considering from 2008 – 2018 and containing only research articles in Web of Science, 95 research articles endured. Out of these 95 articles, only 82 articles were accessible and downloaded. The library was made in end note software with the cutoff date of 1st December 2018. 15 articles were excluded due to language barriers. The remaining 67 articles were searched, and their abstracts were reviewed at the surficial level, and 9 were removed for duplicity, and 30 articles were wholesomely irrelevant and rejected for inclusion. The remaining 28 research papers were finalized to be selected in the review study. The PRISMA framework for the exclusion criteria is shown in the below image.

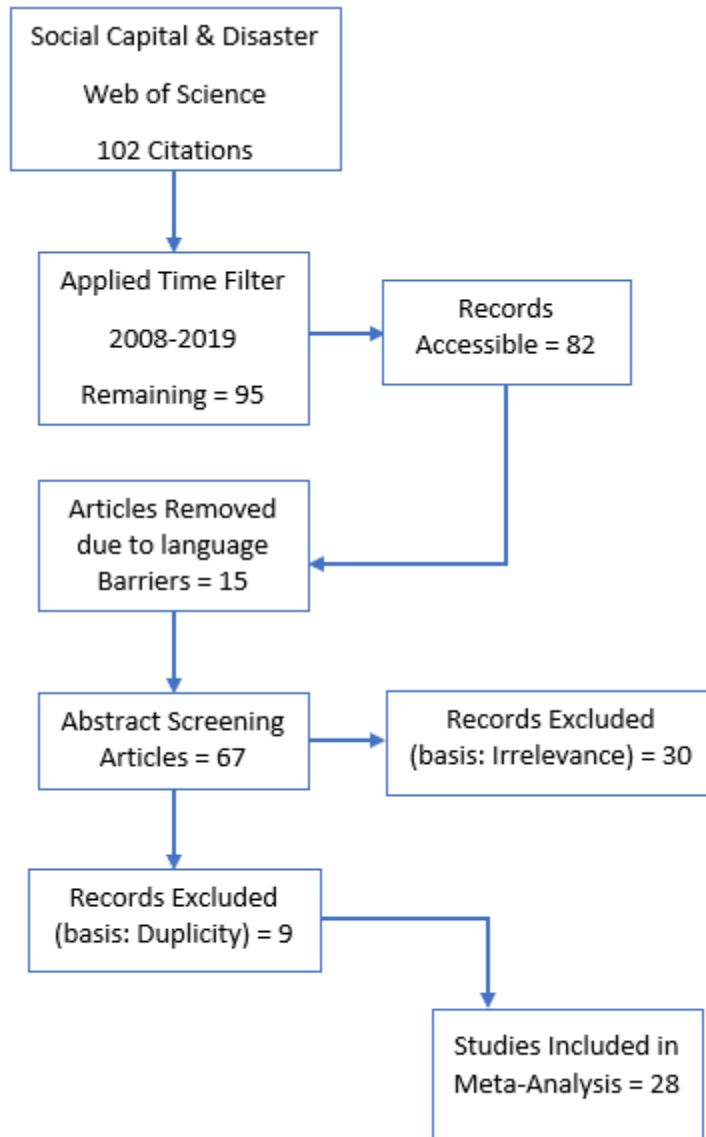


Figure 2 PRISMA Framework Diagram

4.4 Characteristics of Study

A total number of 28 case studies were included in the systematic review. 18% of the studies were related to earthquakes. 3.5% of the studies covered the area of drought, extreme weather events, volcano eruption, and nuclear meltdown individually. Floods and Tsunami covered 7% of the content and 25% of studies conferred about hurricanes, and 21% of the studies had discussed multiple disasters in terms of Social Capital (Figure 3).

With respect to geographical areas of the world, the highest number of studies were based on Asian countries, among which 32% of the research articles were based on disasters in Japan, 3.5% of each in China, Pakistan, India, Sri Lanka, and the Philippines. American countries being the second ones with 18% of studies based in the USA and 3.5% in Peru, whereas European and African countries had the lowest number of research with 3.5% in England and Ethiopia respectively (Figure 4).

Referring to the period of research, 21% of research was done in the year 2019, 11% was carried out in 2018. 18% came up in 2017, and 14% of the papers were published in 2015. 7% of research was being done in the year 2012 and 2016. 3% of research took place in 2018. 3.5% of research was performed in 2008, 2010, and 2014 (Figure 8). 43% of quantitative research was performed and 50% researched were qualitative while the rest, 7%, comprised of both qualitative and quantitative research (Figure 9). Among the research papers, 28.5% comprised of primary data, 14% each consisted of secondary and tertiary data, while the rest, 42.5% was based on both primary and secondary data (Figure 10).

The analyses carried out in the reviewed papers include descriptive analysis, content analysis, policy analysis, and time-series cross-section analysis. 46% of the studies comprised of descriptive analysis, making it the most applied method of analysis. Papers based on policy analysis were 11%, and content analysis was applied to 14% of the reviewed research papers. Only 3.5% of the studies had carried out time-series cross-section analysis, while papers consisting of mixed analysis were 25%, making it the second most used method (Figure 11). The thematic areas of the studies have been categorized into seven factions. First section consists of studies related to disaster management and the role of social capital. The second section of the studies discussed effects of a disaster on mental health. The third section was related to civic and political participation. The fourth and fifth sections covered resource management and informal support while The sixth and seventh sections highlighted social capital's impact on evacuation, age and socioeconomic status (Figure 12).

4.5 Thematic Areas

Following are the thematic areas discussed in the research studies:

- Role and impact of social capital in different phases of disaster, i.e. preparedness, mitigation, recovery, and reconstruction in terms of enriching natural and informational resources, community resilience, food security, human and economic capital, women empowerment, and low-income population.
- Impact of multiple forms of social capital on individual's mental health, cognitive decline, and stress after undergoing a disaster.
- Role of managerial ties in civic associations and its effect on monetary aid post disaster, patterns of political behavior affecting social capital and the effect of perception risk of disaster among the affected people and its relation to their participation in associations or organization.
- Response to food security and managing natural resources by utilizing social capital to achieve desirable trajectories after a disaster.
- Role of customary social capital and correlated socioeconomic ties and their behavior during a disaster and evaluating resources resting in informal connections and ties for recovery after a disaster.
- Influence of social capital on evacuees' behavior.
- Effect of socioeconomic status and age on social capital during a disaster.

4.6 Results and Discussion

In terms of geographic areas, Japan is the country in Asia with the highest quantity of research conducted in disasters pertaining to earthquakes and tsunamis. American countries are second on the list where the USA has the most quantity of research carried out with disasters caused by hurricanes. Europe and Africa are lagging in research in the field of social capital in disaster (Figure 6). With reference to the disasters, the highest number of studies have been observed on hurricanes and earthquakes are second on the list (Figure 3). With regards to years of the studies, a surge has been noted in the research since 2015. Earlier than that, little research was done on social capital and disasters (Figure 8). According to the statistics of the review, both quantitative and qualitative research has been observed in the papers, which implies that social capital is a multi-dimensional concept (Figure 9).

With respect to the thematic areas, the highest quantity of research is regarding the role of social capital in various disaster phases. The second most investigated theme is mental health after

undergoing a disaster. A dearth has been observed in the research pertaining to the management of resources through social capital during a disaster and rendering informal connections a resource for recovery intentions. Minimal research has been carried out on social capital with respect to diverse variables such as age, socioeconomic status, population density, degree of damage, etc., in a disaster perspective (Figure 12).

Following is a comprehensive analysis of results of the thematic areas:

4.7 Disaster Management and Social Capital

Social capital acts as a catalyst in multiple disaster management stages, primarily in recovery and restoration after a disaster. In the recovery phase, strong social relations become a resource in providing access to knowledge and information to members of a community. At the reconstruction stage, social capital acts as a resource rendering the growth of business and employment.

As it happens, it has been observed that not all types of social capital are perpetually constructive for recovery after a disaster. Bonding social capital has been associated with transient means of recovery. As it has been conferred prior that the societal links within a community form bonding capital, the recovery through this form of social capital is limited to the precincts of that precise community while the rest are excluded. Hence, causing the disparity. Whereas bridging and linking capitals are deliberated to mark all communities inclusive to recovery through extended social connections and political ties. The social configuration needs to be transformed for evolving and augmenting bridging and linking capitals for the promotion of social solidarity, which in the long run will lead to viable recovery.

Community resilience with respect to disaster can be enhanced through social capital by involving multiple stakeholders. The review indicates that the communities where multiple stakeholders, e.g., residents, emergency departments, community organizations, municipal government, etc., collaborate for disaster management have better scope for disaster prevention and improved efforts for reduction of risk. Furthermore, the role and responsibility of different stakeholders can be identified for the provision of suggestions pertaining to disaster management and the structure of organizations in different phases of a disaster.

Disaster preparedness was observed prevalent in communities where social interactions were based on the reciprocation of trust. A community where the foundation of interaction among

individuals is trust is more likely to plan and prepare for a disaster beforehand and ascertain that the available resources are shared when the need arises. Equality is another component of disaster preparedness among individuals of a community. A community where inhabitants are certain that their societal connection is replete with fairness and equality, perceive these connections as reserves of resource that can be relied upon during a disaster. Hence, this results in a greater perception of disaster preparedness. Therefore, it can be presumed that a community reporting high calibration of trust are assured of their social relations and their impending aid disaster. This can be labeled as perceived disaster preparedness because the individuals rely on their resilient social network instead of action plans or resources required for disaster preparedness. Consequently, to attain effective preparedness for disaster, it is essential to contribute in both social and physical infrastructure mutually.

Evidence shows that social capital also influences rural community's response to a disaster. A study affirmed that a rural community with a high degree of social capital had an effective action plan to stabilize and enhance food security during and after a disaster. In the case of a low degree of social capital prior to the disaster, the response of the community was not affected due to the intervention of a principal community actor engaged through bridging social capital during and after the disaster. The study indicated that bonding and bridging social capital are a doorway to ascertaining food security during and after a disaster. The study's findings also indicate that social capital is one of the primary components that determine the difference in an individual's sense of place in a community. Finally, the study highlighted the association between the extent of existing social capital in a community and a community's usage and access to physical capital to mitigate disaster leading to food insecurity.

Social relations are means of resources that are embedded in the network. A study demonstrated that informal support for recovery after a disaster and social capital of households were correlated, and that correlation provided a well-defined conception of social ties being a source of informal assistance. It implicated that both bonding and bridging social capitals were the sources of informal aid and support in the networks. These components played a significant role in elevating the recovery rates amongst victims after the disaster. The results of the study indicated that the individuals residing alone when the disaster struck tended to increase connections with friends,

coworkers, and neighbors. This factor signifies the role of bonding social capital for providing informal support post-disaster.

Additionally, an analysis of formal support provided by the government implied that linking social capital was the source of the high satisfaction rate of recovery. A high degree of political and social trust plays a significant role in making communities resilient to disasters and ensuring faster recovery. During a crisis, the aid groups, management bodies, and NGOs must ascertain to keep the social connections of the victims intact to affirm effective recovery through the resources embedded in the networks. The resilience of the social networks, the popularity of the leader, the residents' commitment, and several other factors such as degree of damage, human and economic capital, population density, etc., affect the recovery of a disaster-struck community.

4.8 Mental Health Post Disaster

The social capital of a community has a significant impact on cognitive denial post-disaster. A study demonstrated that social capital in a community reduced the risk of cognitive denial following a disaster. The informal connections and ties assisted in alleviating the traumatic impacts of the disaster. The study indicated the association between cognitive denial and the degree of housing damage that resulted in the disaster. The results of the study implied that the highest rate of cognitive denial was among elderly people. The cause of this decline was not the disaster itself but the trauma caused by relocation. The structural dimension of social capital was observed to have a significant impact on the diminished decline rate as the individuals who had strong social bonds were relocated to the same rehabilitation centers. The study emphasized the need to preserve the existing social capital in the communities in order to enhance their cognitive strength following a disaster. Moreover, further studies validate the association of mental health and social capital's dimension of structure and cognition. The cognitive dimension of social capital (the perception of social relations) was observed to have an alleviating role in diminishing the occurrence of post-traumatic stress disorder among the disaster-struck communities. Another study concluded that a high degree of social capital plays a buffering role between post-traumatic stress disorder and a disaster. An additional study underlined the impact of social capital in reducing distress and anxiety among individuals of a disaster-struck community. This supports the argument that trust perception is the intervening factor through which social capital is positively associated with mental well-being.

4.9 Civic and Political Association

The patterns of political behavior also influence social capital following a disaster. A study analyzed the linking of social capital by investigating the behavior pattern of politicians among council members in a municipal committee after a disaster. The rate of reaching out for assistance by a local politician for the community is influenced by the hierarchy. Damage is another factor that impacts the rate at which they reach out. Greater destruction will lead to more politicians corresponding for potentially beneficial contacts. Local politicians are considered to have a better understanding of the needs and demands of a community than national officials, as they are more physically linked to the community. Risk perception is considered to be associated with civic participation. A study implied that a disaster-struck community's perceived risk is dependent on the organization and associations they participate in and the extent to which they are involved. An individual's perceived risk or experience of disaster may lay a foundation for the formation of the social bond among people who have experienced similar trauma. This bond enhances the social capital in that community.

Evacuees Behavior

It can be argued that social capital is a driving factor for evacuation during a disaster where social ties may be the key factor in evacuation outcomes. The broader the extended network of people, the more likely they evacuate. It can be because the people who are more connected to several communities outside their residing neighborhoods or cities are more at ease with the idea of evacuating temporarily to a new location. After all, they are not afraid of estrangement. Bridging social capital plays a key role in this regard. It acts as a means of information resource. It provides more exposure to the messages and warnings issued by the governing bodies about the impending disaster and recommendations regarding safer evacuation locations. Similar is the case with linking social capital influencing evacuation where people in the community trust the governing bodies and organizations and follow the directives regarding the oncoming disaster. The bonding social capital is negatively associated with evacuation as the members in the community have strong ties within the community. They may perceive that they are at a safer location or will have interminable support if a disaster strikes and, therefore, are not inclined to leave. Moreover, age is another factor that influences evacuation behavior. People around middle age are more likely to not evacuate.

This has an insinuation that mostly middle-aged people with families must overcome several logistical obstacles to evacuate.

4.10 Age and Socioeconomic Status

Several studies can be found that emphasize the role of social capital in disaster or crisis. Only a few of these studies have studied the social capital of a community under the influence of multiple factors of vulnerability such as socioeconomic status and age. The review of the study shows that the social capital effect on the mortality rate of a community of low socioeconomic status was the highest. The most benefitted neighborhoods were the ones with minimal education and poor economic circumstances. Conversely, slight or no decline was observed in the mortality rate of affluent neighborhoods due to a high degree of social inclusion, NGOs, and community facilities. This may be because affluent neighborhoods had fewer occasions to build social connections and collaborate prior to the disaster. This is because the well-off neighborhoods do not have to face the pre-stressor such as immobility, economic scarcity, and marginalization that triggered connection building in low-income neighborhoods prior to the disaster. With respect to the factor of age, social capital's impact on mortality rate was only witnessed among the elderly. The elderly above the age of 65 with higher social connections had lesser mortality than the elderly with fewer social relations. The mortality rate of the younger individuals was observed to have no effect on social capital.

4.11 Conclusion

This study was a systematic review of the role of social capital in disaster, using the PRISMA method. The result of the whole exercise is a holistic, all-encompassing synthesized version of literature about social capital in disaster. The work contributes to existing knowledge as an effort to find contemporary trends, lacunas in the existing body of knowledge, and possible areas to be focused on for future research. The sum and substance of the discussion are that social capital can play a pivotal role in mitigating the risk and impact of disasters through informal network ties, social connectedness, trust, and political involvement inculcating social interventions. However, that has to be made sure through effective and all-inclusive policies that are implemented in letter and spirit with constant upgradation.

Regarding the review, minimum research has been carried out on the topic of social capital and its impact on the disaster in African and European countries, which highlights the potential area for research. Moreover, there is a lot of room for research on social capital and disaster in the effect of multiple vulnerability or resilience factors. Most of the research studies were conducted on meteorological, hydrological, and geological disasters. Studies on climatological and man-made disasters are limited in quantity. This study has been carried out to study the use of social capital in disasters and its contribution to disaster studies.

4.12 Future Recommendations

Preserving the social capital of a neighborhood or community should be advocated after a disaster as a perpetuation of social connections is crucial for strengthening cognitive resistance following a disaster.

To ensure sustainable recovery after a disaster, the social structure needs to be transformed to strengthen different types of social capital (bridging, linking, bonding) and encouraging social coherence.

Pre-disaster and post-disaster community based interventions should be able to enhance the cognitive form of social capital, which in the long run diminish the lasting effects of disasters on individuals and ensure access to better quality mental health services.

Identification of vulnerable populations consisting of geographically centered or smaller networks through the formation of a methodology and measures to ensure the provision of sufficient information regarding the disaster.

Ensuring coordination among local and national governing bodies in the design and implementation of recovery projects to avoid ineffective and incompatible allocation of projects.

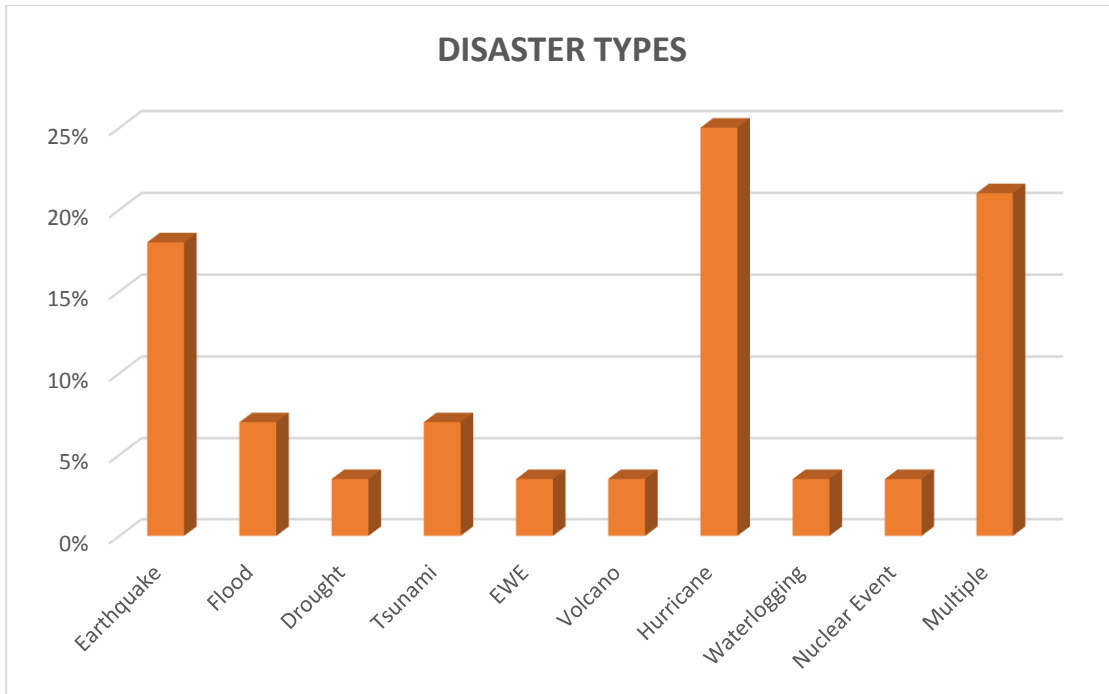


Figure 3 Types of Disasters

The figure above shows the types of disasters that have been studied in the existing research. There are a total of nine types, among which earthquakes and hurricanes are the most discussed.

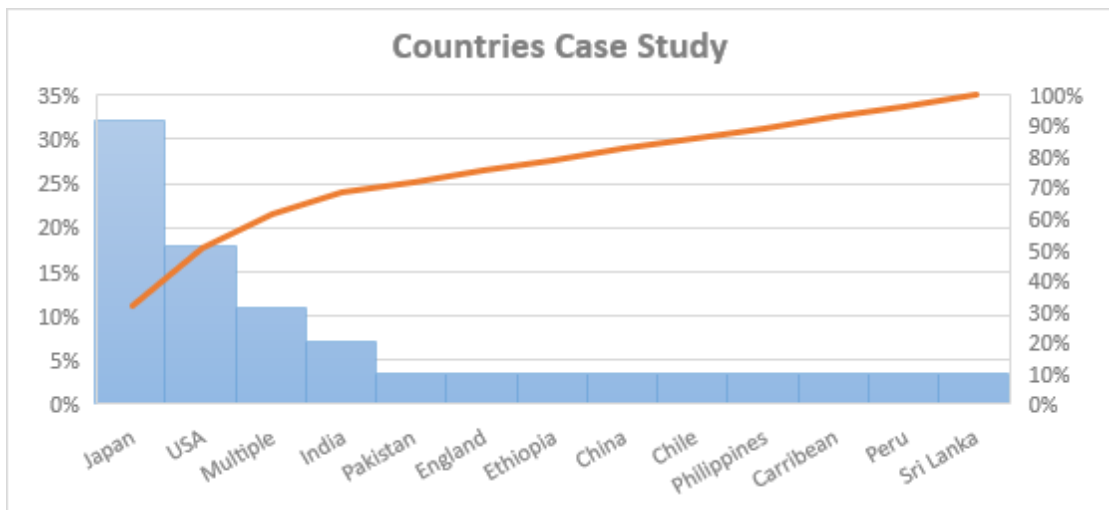


Figure 4 Countries Case Study

The figure above shows the number of countries where cases of social capital in disasters has been studied. There are a total of twelve case studies of countries. Most case studies were found to be in Japan and USA.



Figure 5 Countries Wise Distribution

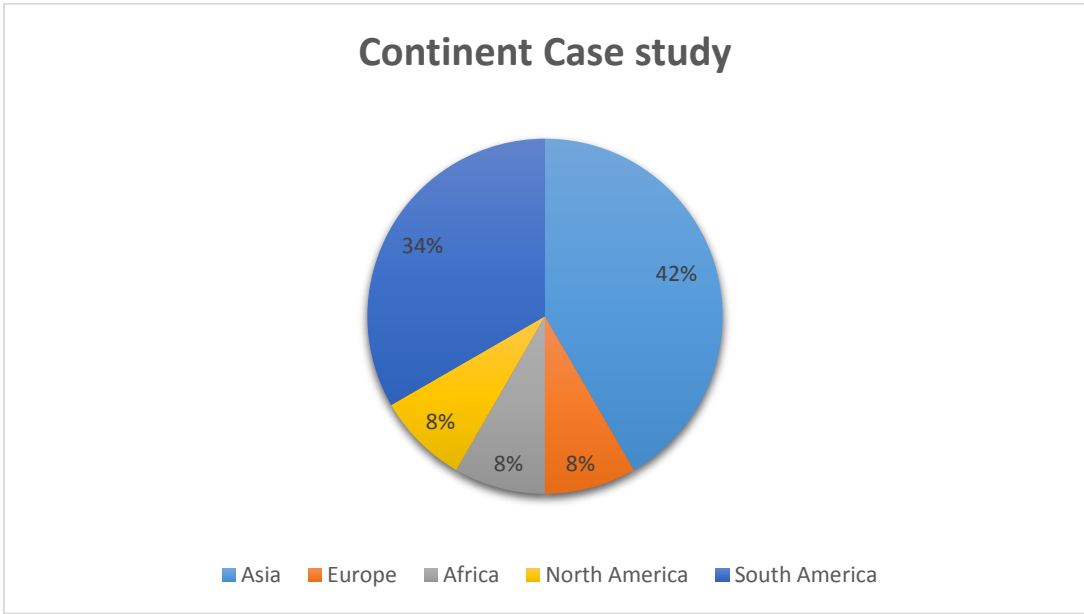


Figure 6 Continent Wise Distribution

The figure above shows the number of continents where cases of social capital in disasters has been studied. There are a total of five continents here case studies have carried out. Most case studies were found to be in Asia and South America.

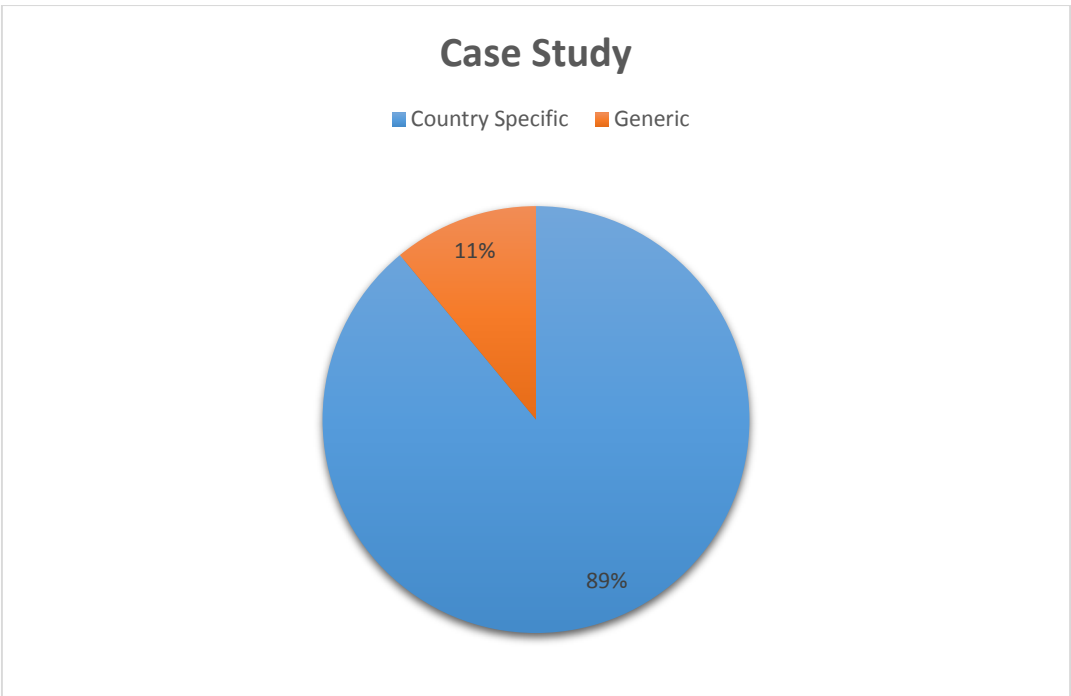


Figure 7 Case Study

The figure above shows that 89% of the existing research on social capital in disasters is country specific while 11% of the studies are generic.

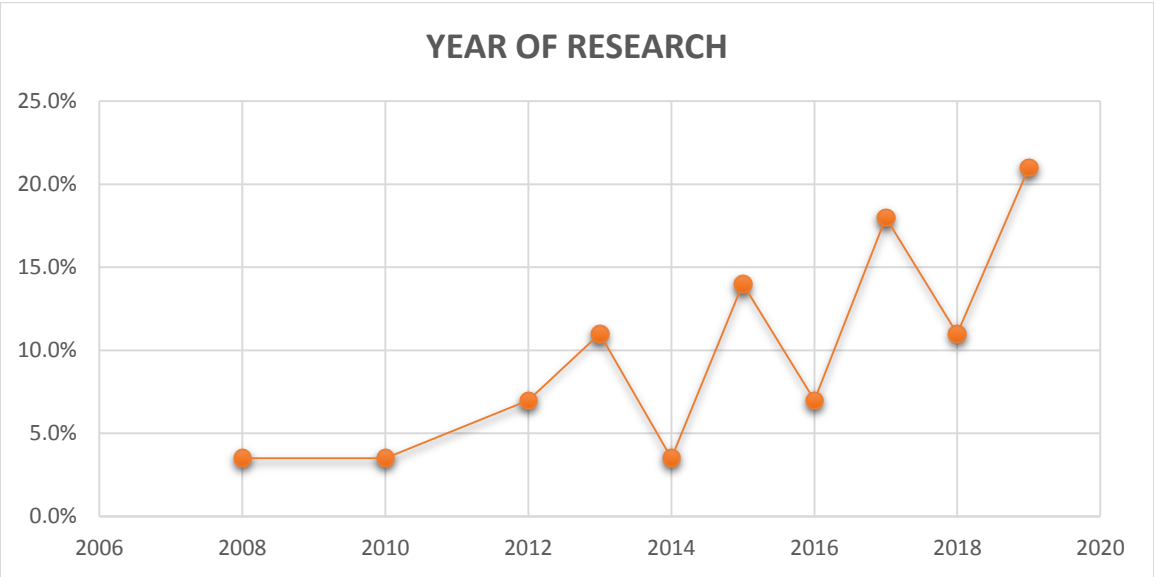


Figure 8 Year wise Distribution

The chart above shows that there has been a surge in the research carried out on social capital in disasters for year 2014 to 2018.



Figure 9 Research Type Distribution

The chart above shows that 50% of studies were quantitative, 43% were qualitative and 7% of the studies were a combination of both.

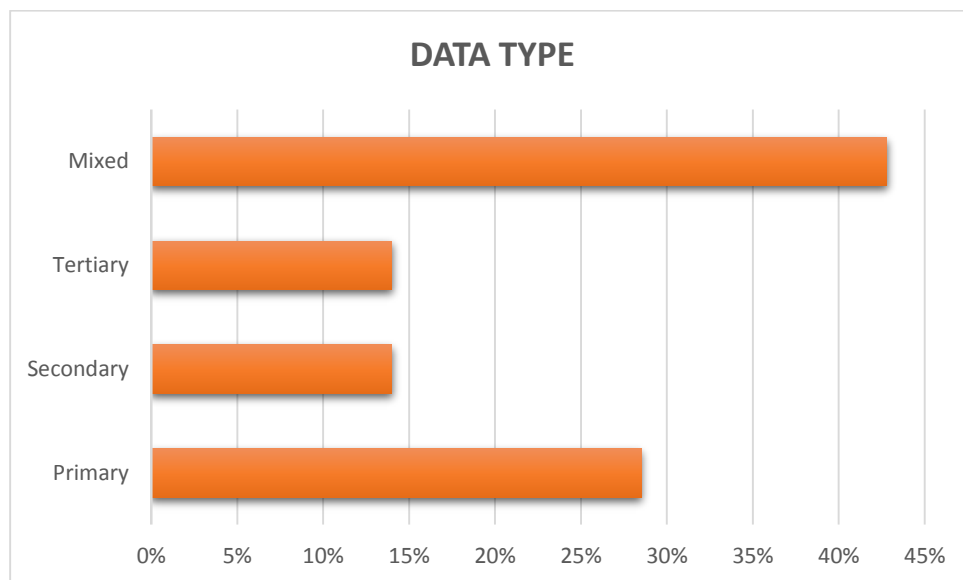


Figure 10 Data Type Wise Distribution

The chart above shows the data type distribution among the studies. It states that 43% of the studies were of mixed data type, 28% of the studies consisted of primary data while 14% of the studies consisted of secondary and tertiary data.

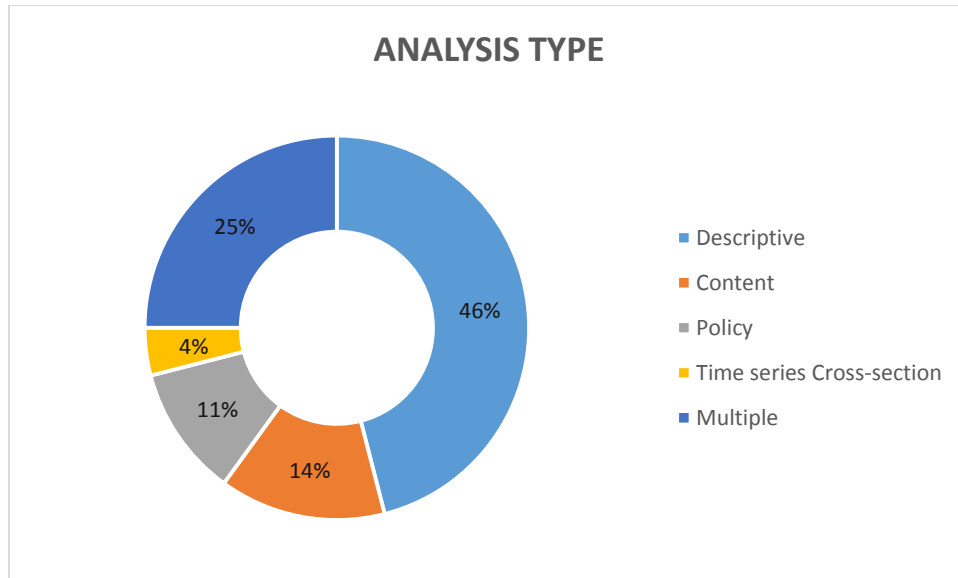


Figure 11 Analysis Type Wise Distribution

The chart above shows the distribution of analysis type among the reviewed studies. 46% of the studies consisted of descriptive analysis, 14% consisted of content analysis, 11% was policy analysis, 4% was time series cross section analysis and 25% was a combination of all.

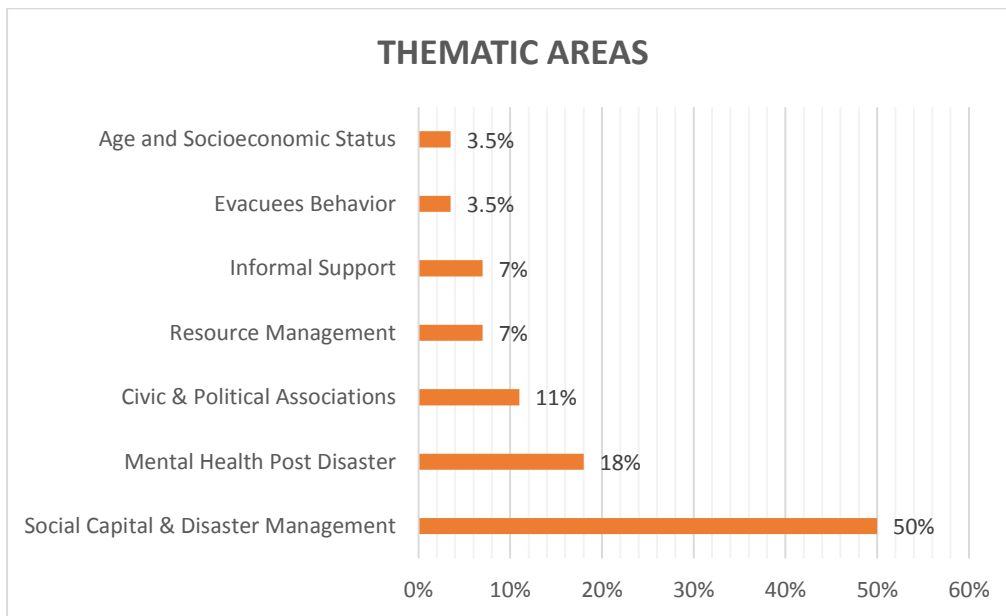


Figure 12 Thematic Areas Distribution

The chart above shows the seven sections of thematic areas and its distribution.

Chapter 5

Profile of the Respondents

In Respondents' profile, unvaried facts and figures are collected through surveys conducted. It is highly significant for it provides the basic information regarding the respondents' age, gender, income, education, household size, etc. Moreover, it helps contextualize the study, so almost 420 people were surveyed and studied for this research. The results of 400 data samples are as follows:

5.1 Age

Age Group	Formal		Informal		Chi-Square Test
	Satellite Town	I-9/I-10	Dhoke Ratta	Eisa Nagri	
18-27	29	16	23	30	X ² =21.5 Sig=0.25
28-37	39	45	28	39	
38-47	18	17	21	16	
48-57	11	12	21	11	
58-67	8	8	6	4	
68+	1	2	1	-	
Mean	3.45	3.56	3.62	3.2	
Standard Deviation	1.24	1.26	1.27	1.11	

Table 2: Age

In research methodology, the age of respondents plays an important part in the analysis of the sociology of people. The age group makes it easy to categorize people for their views. The table shows the age survey of people living in two areas of Islamabad and Rawalpindi: Eisa Nagri, I-9/I-10, and Dhoke Ratta, Satellite Town, respectively.

It is quite apparent that most people belong to the age group 28-37 years in all four areas, 39% in Eisa Nagri, 45% in I-9/I-10, 28% in Dhoke Ratta, and 39% in Satellite Town. The second significant amount of people belong to younger people of age group 18-27 years, with 30%, 16%,

23%, and 29% respectively. The significant value is 0.25, which is less than 0.05. Therefore, there exists an insignificant difference exists in all areas.

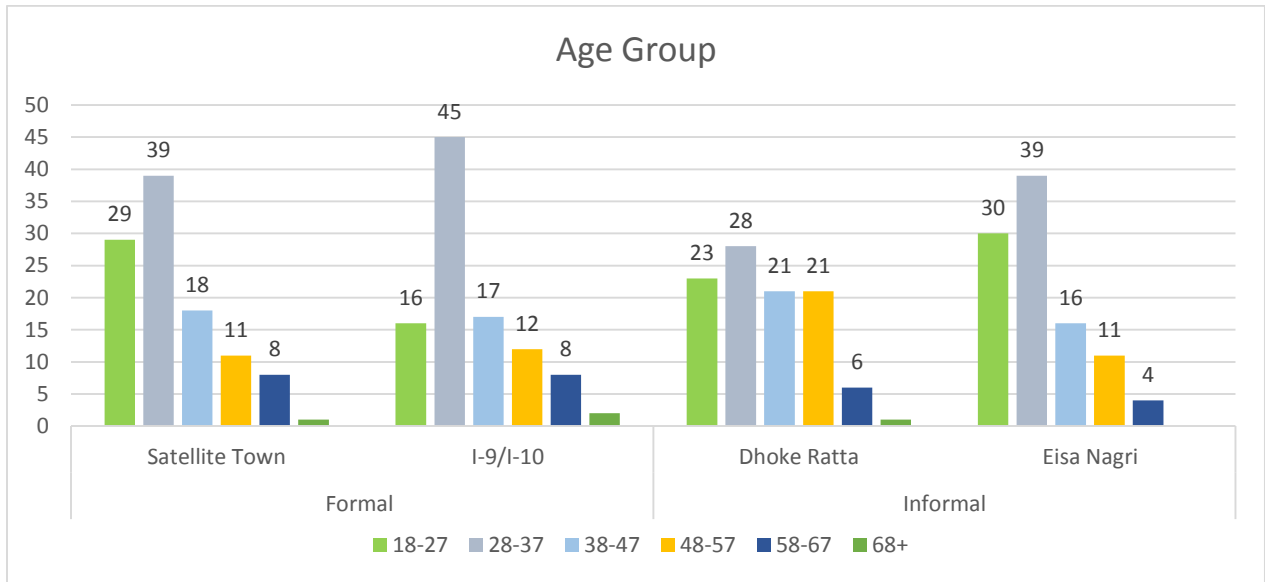


Figure 13 Age group

5.2 Gender

In social sciences, the gender of a person plays a vital role in understanding the views and standing of a person in their household. In a thesis where the impact of social capital in disaster-prone areas is assessed, this aspect of respondents' profile becomes particularly critical because both males and females play different roles in the social capital of a society facing a disaster.

Gender	Formal		Informal		Chi-Square Test
	I-9/I-10	Satellite Town	Eisa Nagri	Dhoke Ratta	
Male	75	78	68	82	X ² =5.7
Female	25	22	32	18	Sig=0.13
Mean	1.25	1.22	1.32	1.18	
Standard Deviation	0.44	0.42	0.47	0.39	

Table 3: Gender

It is apparent from the table that the male category dominated the survey in all areas. The percentage of female participants in the survey is higher in Islamabad (Eisa Nagri and I-9/I-10) and lower in Rawalpindi, with barely 18% and 22% in Dhoke Ratta and Satellite Town, respectively. Also, the significant value is 0.13, which is greater than 0.05. Therefore, there exists an insignificant difference exists in all areas.

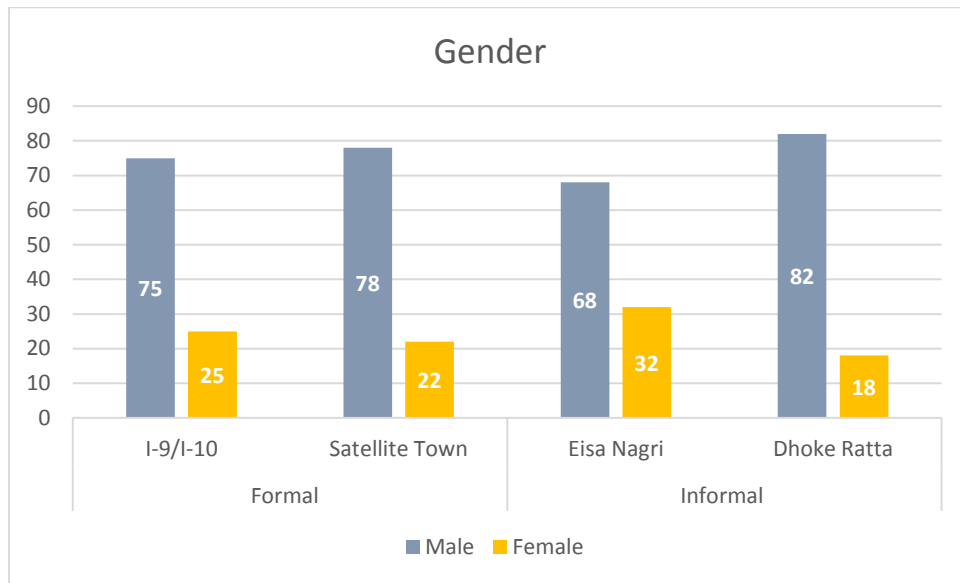


Figure 14 gender

5.3 Household Income

The household income is directly related to the economic conditioning of any family. Financial status plays a crucial role in how people deal with the day-to-day affair and crisis situations. So, here we have collected the following data as an important factor in the lives of respondents:

Income	Formal		Informal		Chi-square Test
	I-9/I-10	Satellite Town	Eisa Nagri	Dhok Ratta	
<=10000	1	1	4	-	X ² =235.1 Sig=0.03
10001 - 50000	88	40	96	9	
50001 - 90000	11	34	-	53	
90001 - 130000	-	15	-	22	
130001 - 170000	-	2	-	8	

170001 - 210000	-	4	-	5
Mean	2.1	3.05	1.96	3.56
Standard Deviation	0.33	1.29	0.19	1.12

Table 4: Household Income

It is evident from the table that the monetary conditions of both formal settlements I-9/I-10 and Satellite Town are analogous, and both informal settlements Eisa Nagri and Dhoke Ratta are similar regardless of where they are located.

In Eisa Nagri and Dhoke Ratta, the majority of participants, i.e., 96% and 88%, belong to income level 10000-50000. In Satellite Town, 40% of the participants have income levels up to Rs. 50000, which is the highest while the second highest is 34% which lies in up to Rs. 90000 income level. This area also has the highest percentage of the highest income group, which is 4%. In I-9/I-10, 53% of the participants have income levels up to Rs. 50000, which is the highest while the second highest is 22% which lies in up to Rs. 90000 income level. This area has the second-highest percentage of the highest income group, which is 3%. Moreover, the Chi-Square Test shows a major difference in both areas because the value of the test is 0.03.

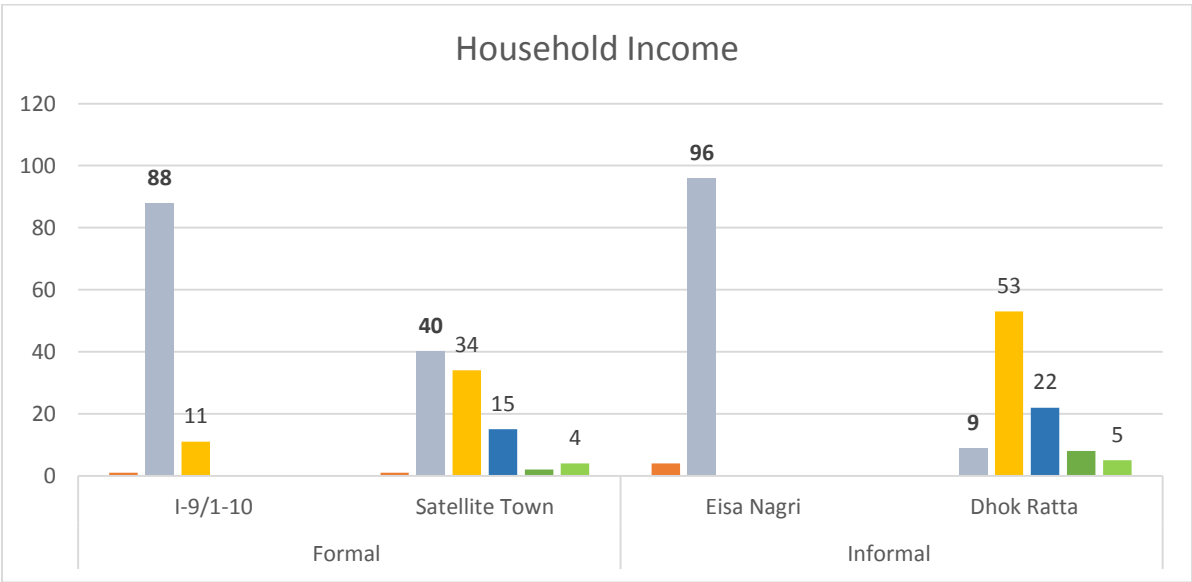


Figure 15 Household Income

5.4 Household Size

When conducting research, the household size greatly influences the social conditioning of a family. It plays an important role in the distribution of economic assets and other resources, which are pivotal to family life as a whole and on the individual level.

Household Size	Formal		Informal		Chi-square Test
	Satellite Town	I-9/I-10	Dhoke Ratta	Eisa Nagri	
2-4	39	49	34	12	Sig=0.01 X ² =97.8
5-7	52	41	33	32	
8-10	9	10	20	34	
11-13	-	-	11	15	
14+	-	-	2	7	
Mean	2.7	2.61	3.12	3.72	
Standard Deviation	0.63	0.67	1.1	1.01	

Table 5: Household Size

The table depicts that in Eisa Nagri, two-third of the participants have household sizes between 5-7 and 8-10 members (34% and 32%), respectively. In I-9/I-10 majority of the participants' household size is among the groups of 2-4 and 5-7 members. In Dhoke Ratta, most participants (34% and 33%) have 2-4 and 5-7 members in the household. While in Satellite Town, the majority lies in the 5-7 members cohort (52%). These statistics show us that both informal settlements have the same pattern of household sizes regardless of which city they are located. Similarly, both formal settlements of Rawalpindi and Islamabad have somewhat similar analogous patterns of household size among the participants. The value 0.01 of Chi-Square shows a significant difference among the household sizes.

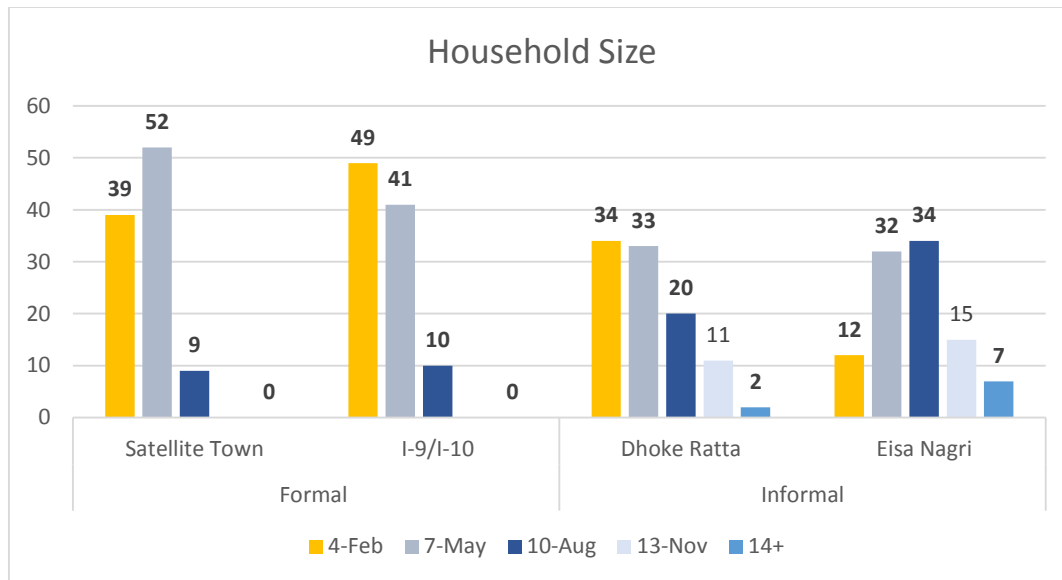


Figure 16 Household size

5.5 Education

Education is a pivotal aspect that shows the level of awareness and consciousness individuals have. Their decision-making regarding normal and crisis situations can be predicted through their education level.

Education	Formal		Informal		Chi-square Test
	Satellite Town	I-9/I-10	Dhoke Ratta	Eisa Nagri	
Uneducated	2	-	20	28	X ² =227.2 Sig=0.02
Matric	9	3	39	48	
Intermediate	16	7	20	21	
Graduate	49	58	18	3	
Postgraduate	23	32	3	-	
Mean	2.32	2.85	2.13	2.51	
Standard Deviation	1.83	0.853	0.91	1.038	

Table 6: Education

The table shows that a major portion of people has matric level education in Eisa Nagri which is about roughly 48%. It is followed by Intermediate at 21% respectively. Lastly, only 3% of people have a degree of graduate level. Similar is the case with Dhoke Ratta, where most participants have matric level education which is 39%, preceded by 20% of uneducated people. Only 20% have passed Intermediate, followed by graduates that make up only 18% of the participants whereas only 3% have education level up to post-graduate.

The formal settlements have a somewhat similar pattern of education for the participants. Most of the participants in I-9/I-10 have education up to graduate level (58%), while in Satellite Town, 49% of the participants have graduate-level education. Both areas have a higher number of post-graduate participants, i.e., 32% and 23% in I-9/I-10 and Satellite Town, respectively. Moreover, there is a significant difference among the education of the participants of all four areas because the value of Chi-square is 0.02 only.

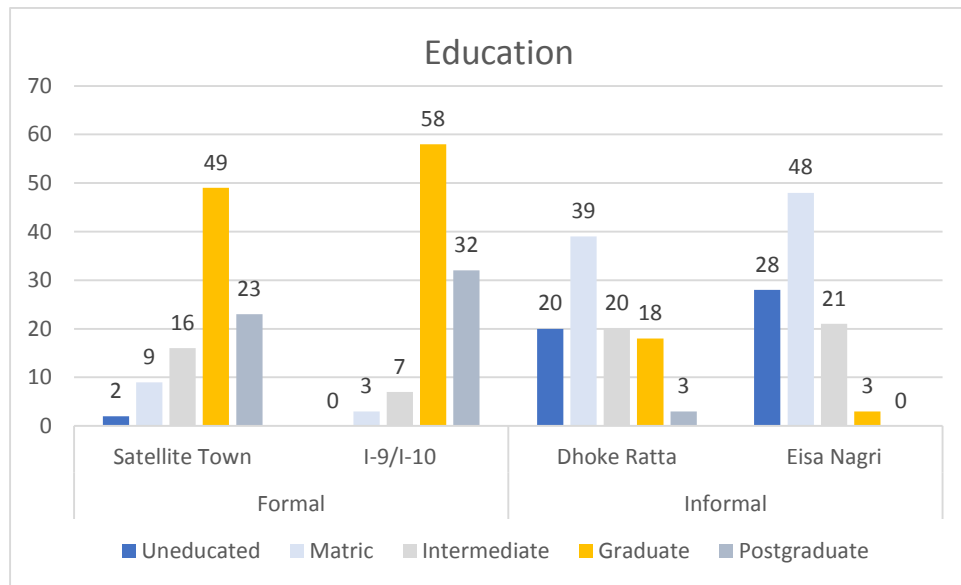


Figure 17 Education

5.6 Education of Household Members

The following tables show the education of household members of the participants.

5.6.1 Eisa Nagri

No. of Household Members	Uneducated	Matric	College	University
	Frequency/ Percentage	Frequency/ Percentage	Frequency/ Percentage	Frequency/ Percentage
<=0	6.0	1	29.0	97.0
1-4	57.0	99.0	71.0	3.0
5-8	35.0	-	-	-
9+	2.0	-	-	-
Mean	2.33	2.13	1.71	1.03
Standard Deviation	0.62	0.39	0.46	0.17

Table7:Education of Household members (EN)

The table shows that about 57% of 1-4 members of each family are uneducated in Eisa Nagri, whereas 35% of 5-8 members of each participant's family are uneducated. 99% of 1-4 members of each household have education up to matric. Similarly, the cohort of 1-4 has college-level education, which is 71%, and only 3% of 1-4 members have university-level education in each household.

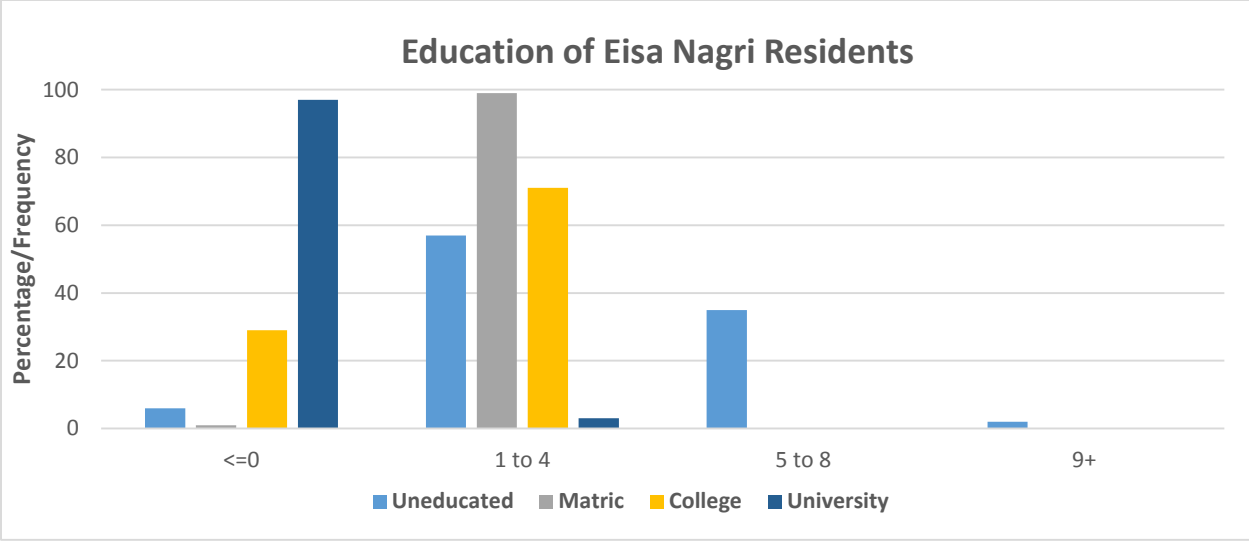


Figure 18 Education of household members (EN)

5.6.2 I-9/I-10

No. of Household Members	Uneducated	Matric	College	University
	Frequency/Percentage	Frequency/Percentage	Frequency/Percentage	Frequency/Percentage
<=0	71.0	57.0	17.0	4.0
1-4	29.0	43.0	83.0	96.0
Mean	1.29	1.43	1.83	1.96
Standard Deviation	0.45	0.49	0.37	0.19

Table 8: Education of household members (I-9/I-10)

The table shows that 29% of 1-4 members in each household are uneducated, 43% of 1-4 members have matric level education, 83% of 1-4 members have education up to college level, while 96% of 1-4 members in each household have education up to university.

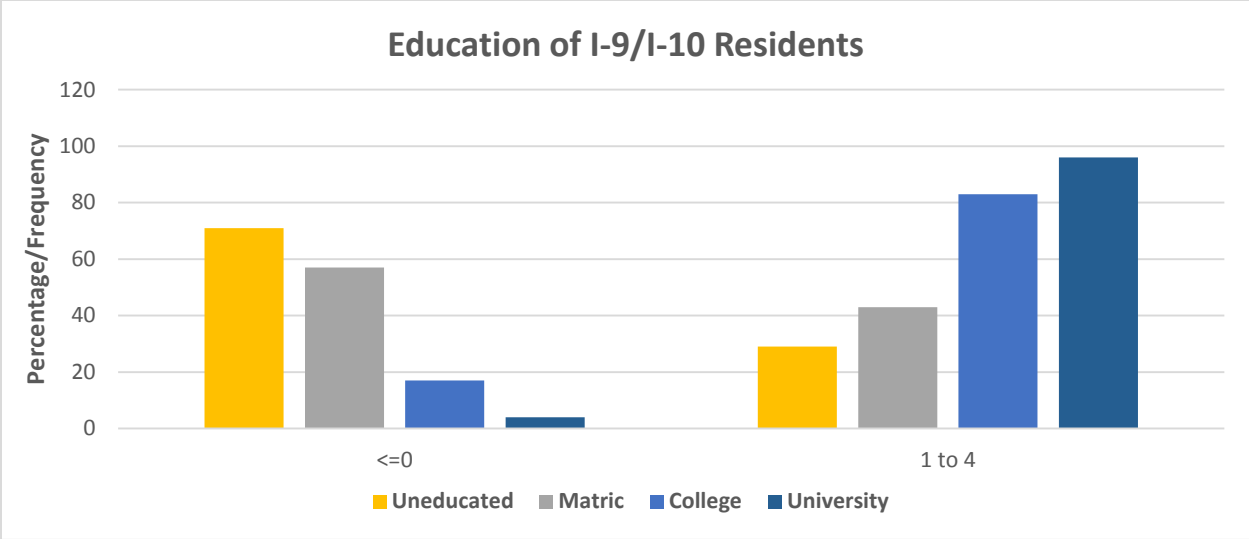


Figure 19 Education of household members (I-9/I-10)

5.6.3 Dhoke Ratta

No. of Household Members	Uneducated	Matric	College	University
	Frequency/Percentage	Frequency/Percentage	Frequency/Percentage	Frequency/Percentage
<=0	28.0	19.0	54.0	73.0
1-4	62.0	81.0	46.0	26.0
5-8	10.0	-	-	-
Mean	1.86	1.46	1.28	1.81
Standard Deviation	0.47	0.50	0.47	0.58

Table 9: Education of household members (DR)

The table shows that 62% of the households have 1-4 uneducated members, 81% have matric-level education, 46% have college-level education, and 26% of 1-4 members in each household have university-level education. The cohort of 5-8 members is uneducated in only 10% of the households.

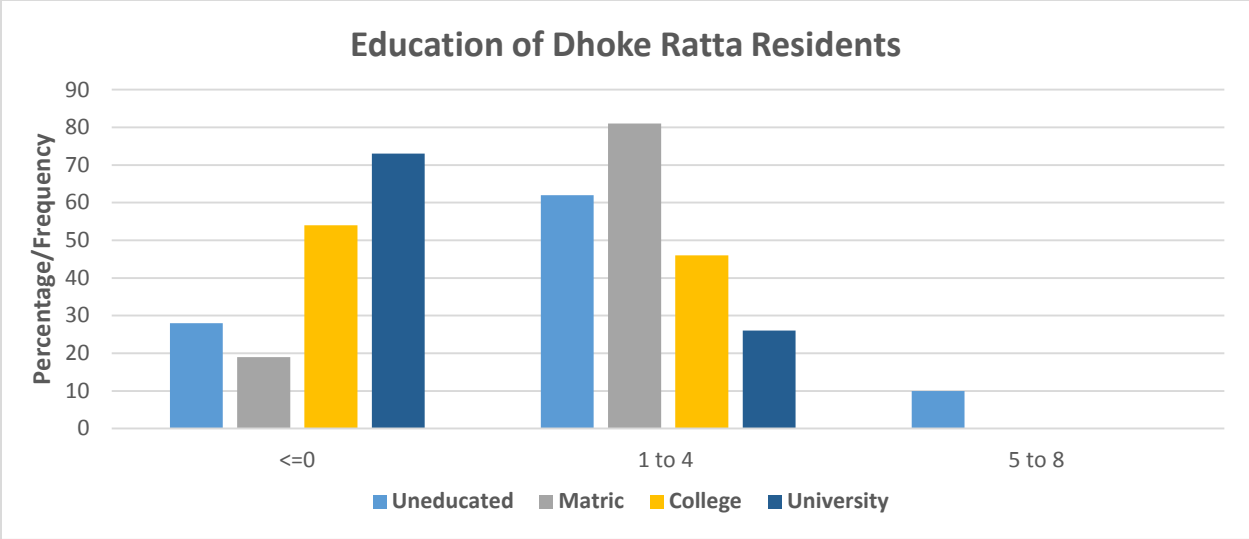


Figure 20 Education of household members (DR)

5.6.4 Satellite Town

Household Members	Uneducated	Matric	College	University
	Frequency/ Percentage	Frequency/ Percentage	Frequency/ Percentage	Frequency/ Percentage
<=0	53.0	23.0	15.0	21.0
1-4	47.0	77.0	85.0	79.0
Mean	1.77	1.85	1.79	1.47
Standard Deviation	0.42	0.35	0.41	0.50

Table 10: Education of Household members (ST)

The table shows that a cohort of 1-4 members is uneducated in 47% of the households. 77% of 1-4 members in each household have education up to matric, 85% up to college, and 79% have up to university level education.

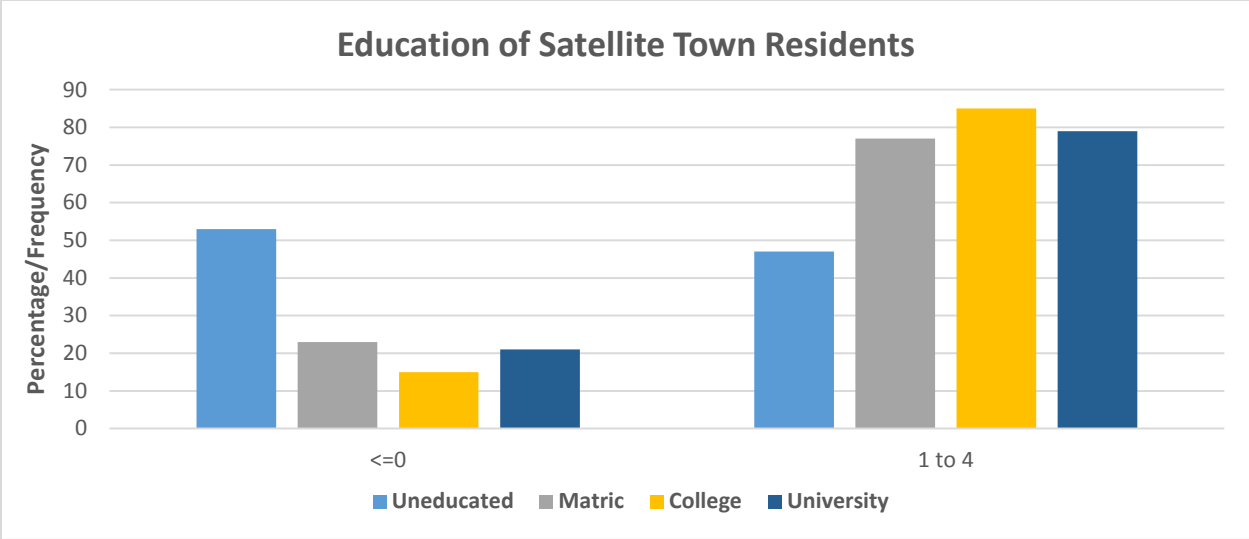


Figure 21 Education of household members (ST)

5.7 Number of Children in the Household

The pattern of child and adolescent development is impacted by social capital. Important aspects of social and cognitive functioning, educational milestones, psychological and physical wellbeing are associated with a high level of social capital in a community. Studies suggest that communities with children and adolescents are conducive to social capital because their parents are mostly connected through the network through their children. That enhances social capital (Shira Offer and Barbara Schneider, 2007). Moreover, in a disaster, children are most vulnerable because of their age.

No. of Children in Household	Formal		Informal		Chi-square Test
	Satellite Town	I-9/I-10	Dhoke Ratta	Eisa Nagri	
<= 0	39	31	24	29	X ² =24.9 Sig=0.52
1-4	61	69	66	68	
5+	-	-	10	3	
Mean	1.61	1.69	1.86	1.74	
Standard Deviation	0.49	0.46	0.56	0.51	

Table 11: Number of Children in Household

The table shows that in Eisa Nagri, 68% of the households have up to children, 69% of the households in I-9/I-10 have up to children, 66% of the households have up to children in Dhoke Ratta and 61% of the households have up to children. The Chi-square value shows no significant difference among all four areas. In Eisa Nagri and Dhoke Ratta, only 3% and 10% of the households have more than 5 children.

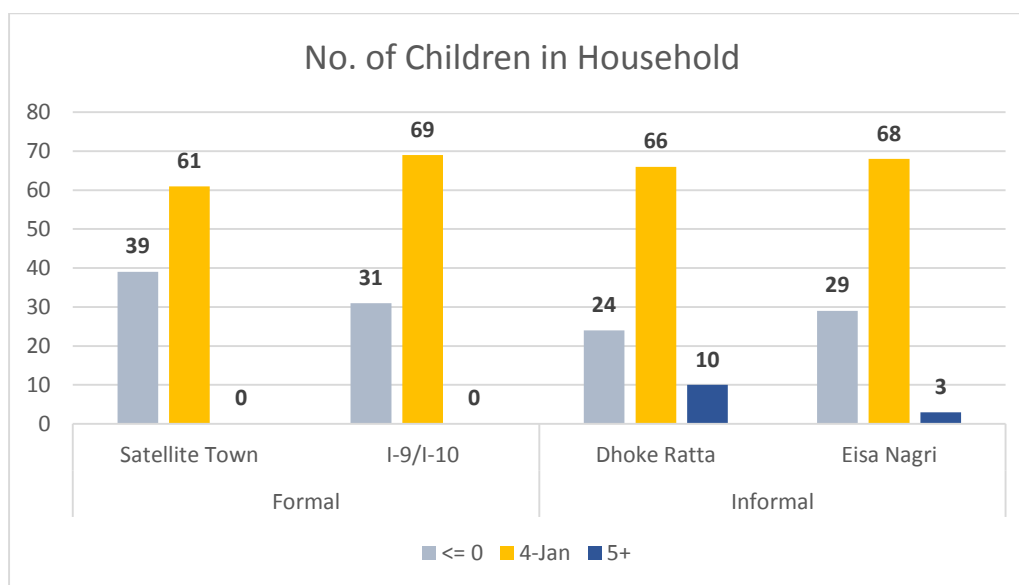


Figure 22 Number of children in house

5.8 Number of Adolescents

No. of Adolescents in Household	Formal		Informal		Chi-square Test
	Satellite Town	I-9/I-10	Dhoke Ratta	Eisa Nagri	
<=0	66	76	24	29	X ² =11.8 Sig=0.63
1-2	34	23	55	64	
3-5	-	-	15	7	
6 +	-	-	6	-	
Mean	1.34	1.23	2.03	1.78	
Standard Deviation	0.47	0.42	0.79	0.56	

Table 12: Number of Adolescents in Households

The table above shows that 64% of households in Eisa Nagri, 23% in I-9/I-10, 55% in Dhoke Ratta, and 34% in Satellite Town have up to 2 adolescents. In Eisa Nagri and Dhoke Ratta, 7% and 15% of households have up to 5 adolescents, whereas in Dhoke Ratta, only 6% of the households have more than 6 adolescents. The value of Chi-square is 0.63 greater than 0.05, which shows no significant difference in all four areas.

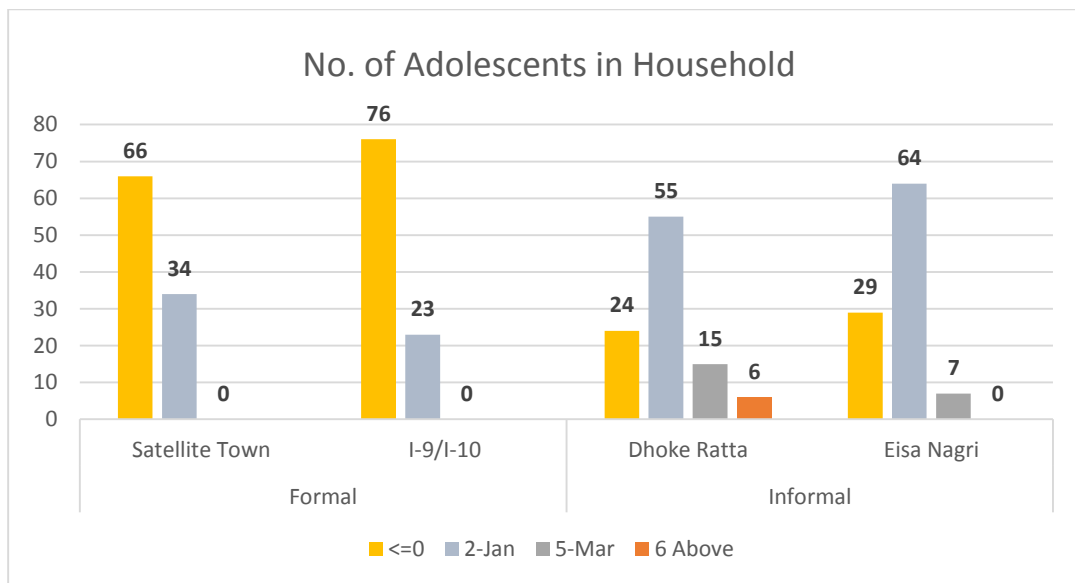


Figure 23 Number of Adolescents in Household

5.9 Number of Women in the Household

Women in a household play a significant role in determining the vulnerability of a household in disaster-prone areas. Most women must face the socio-economic impacts of a disaster. Women are mainly vulnerable due to limited control or no access to resources that ensure security. Moreover, women also play a pivotal role in strengthening the social capital in a community because of their strong social ties.

No. of Women in Household	Formal		Informal		Chi-square Test
	Satellite Town	I-9/I-10	Dhoke Ratta	Eisa Nagri	
1-3	95	96	57	60	X ² =82.8 Sig=0.34
4+	5	4	43	40	
Mean	2.03	2.04	2.43	2.4	

Standard Deviation	0.22	0.19	0.49	0.49	
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Table 13: Number of Women in Household

The table above depicts in Eisa Nagri 60% of the households have 1 to 3 women each, in I-9/I-10 96% have up to 3 women in the household, in Dhoke Ratta, its 57% and in Satellite Town, 95% of the households have between 1 to 3 women each. Here Eisa Nagri and Dhoke Ratta share the common pattern of 40% and 43% of respondents with more than 4 women in their households. The value of Chi-square is less than 0.05, which shows an insignificant difference between the four areas.

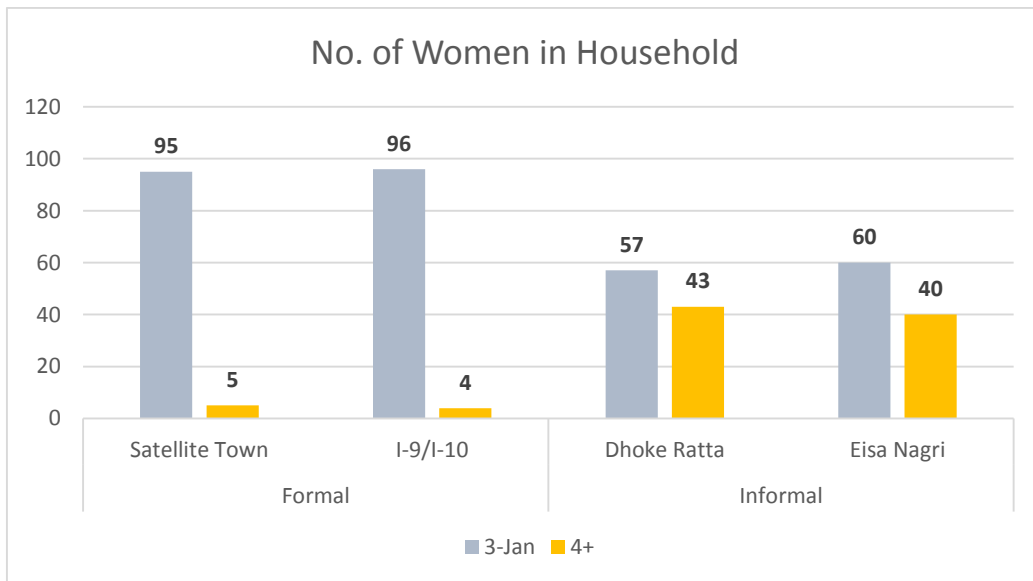


Figure 24 Number of Women in Household

5.10 Number of Elderly in the Household

The number of elderly in a household determines the vulnerability of that household to a disaster. Since the elderly people have diminished strength, reduced sensory cognizance, and weak tolerance of physical actions, therefore, they are considered to be more susceptible and exposed.

No. of Elderly in Household	Formal	Informal	Chi-square Test
-----------------------------	--------	----------	-----------------

	Satellite Town	I-9/I-10	Dhoke Ratta	Eisa Nagri	
0	40	54	40	22	X ² =30.3 Sig=0.52
1	39	20	27	33	
2	21	26	33	45	
Mean	0.81	0.72	0.93	1.23	
Standard Deviation	0.76	0.85	0.85	0.79	

Table 14: Number of Elderly in the Household

54% of the households in I-9/I-10, 40% of the households in Dhoke Ratta and Satellite Town each have no elderly in the household. 45% of the households in Eisa Nagri have 2 elderly making it the most vulnerable area with respect to an elderly population. The value of Chi-square 0.52 shows no significant difference among the data.

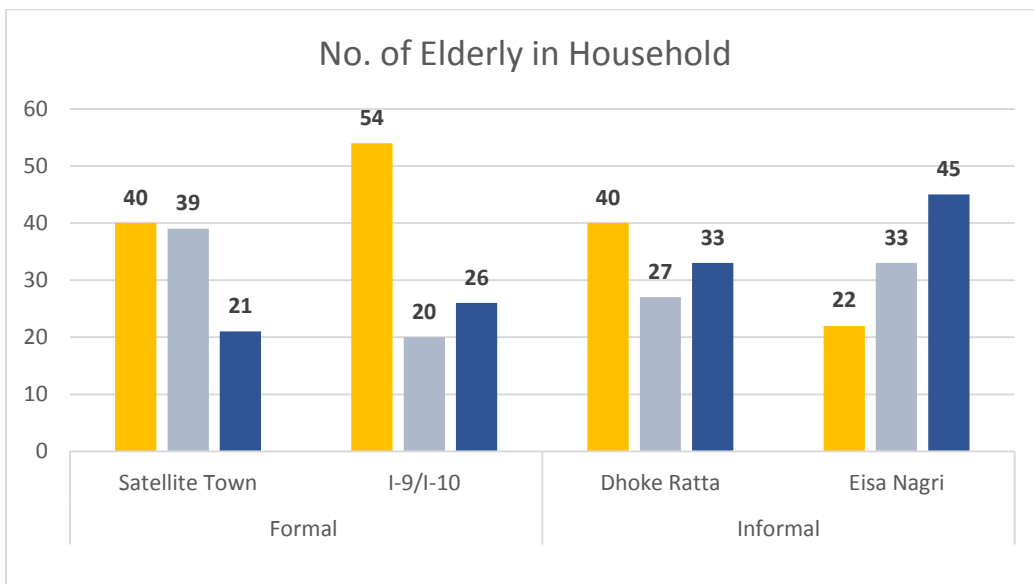


Figure 25 Number of Elderly in the Household

5.11 People Earning in Household: Females

People earning in a household determine the economic stability of a household. This economic stability is a key to resources for food security, shelter, and other aspects of life. A household's increased income will result in increased resources. For monetary stability, it is necessary for both

males and females to contribute to the household income. This may lead to reduced vulnerability in case of a disaster. Moreover, suppose a community has its fair share of women working and earning and contributing to the economic strata. In that case, it will help in mobilizing the community and will positively influence the social capital of that community.

Women Earning in Household	Formal		Informal		Chi-square Test
	Satellite Town	I-9/I-10	Dhoke Ratta	Eisa Nagri	
<=0	34	54	67	28	X ² =70.8 Sig=0.018
1-2	56	45	16	44	
3+	10	1	17	28	
Mean	1.76	1.47	1.5	2.0	
Standard Deviation	0.62	0.52	0.77	0.75	

Table 15: Women Earning in the Household

In the table above, Eisa Nagri has 44% household that comprises of up to 2 females earning whereas 28% households have more than 3 earning females in the household. In I=9/I-10, 54% of households have no earning female while 45 % have 1 or 2 working women. Dhoke Ratta has the lowest number of women working with 16% and 17% of 1 or 2 females and more than 3 females, respectively. Satellite Town has the highest percentage of females earning with 56% households with at least 1 or 2 working women. The value of Chi-square is less than 0.05. Therefore, there exists a significant difference among the four areas.

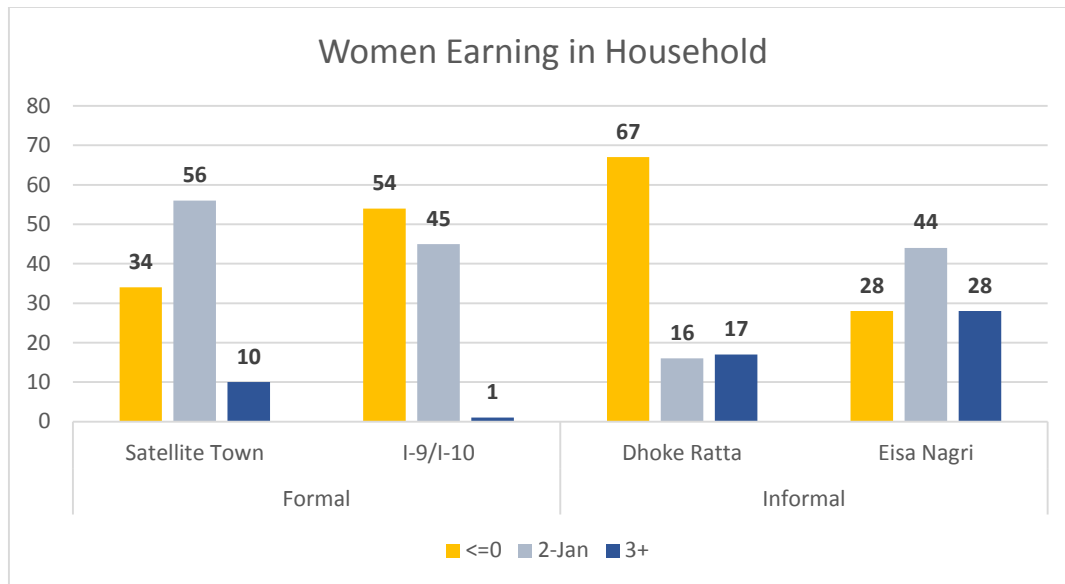


Figure 26 Women earning in the household

5.12 People Earning in Household: Males

Men Earning in Household	Formal		Informal		Chi-square Test
	Satellite Town	I-9/I-10	Dhoke Ratta	Eisa Nagri	
<=0	2	2	2	4	X ² =30.5 Sig=0.01
2-Jan	98	92	78	90	
3+	-	6	20	6	
Mean	1.98	2.04	2.18	2.02	
Standard Deviation	0.14	0.28	0.44	0.31	

Table 16: Number of Males Earning

In the table, both Eisa Nagri and I-9/I-10 have almost the same number of households with 90% and 92% of at least 1 or 2 men earning whereas Dhoke Ratta and Satellite Town have 78% and 98% of the households with 1 or 2 earning males, respectively. At the same time, only Dhoke Ratta has 20% of the households with more than 3 earning male members. Moreover, the 0.01 value of Chi-square shows a significant difference among the areas.

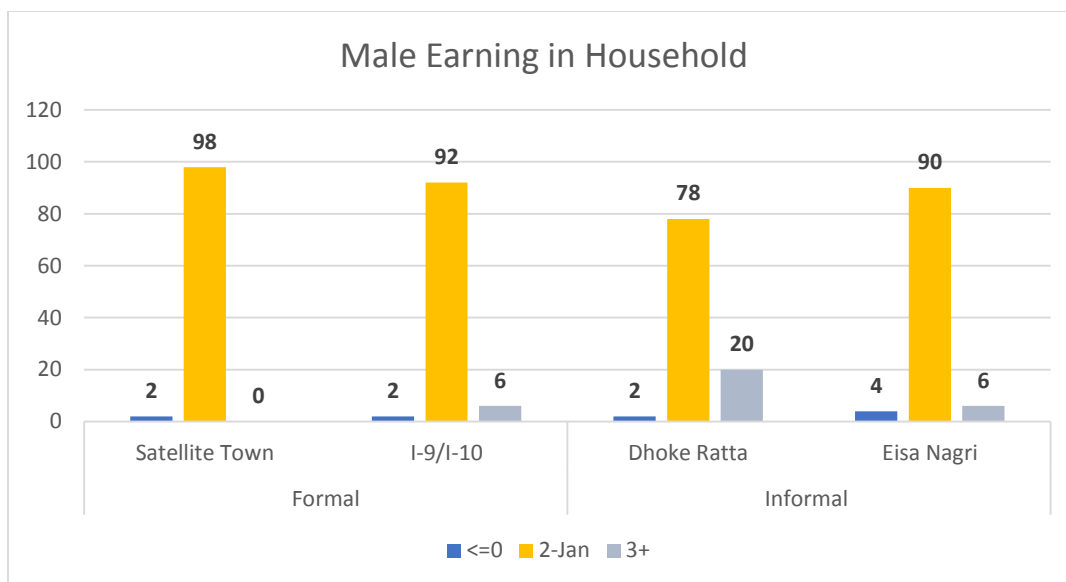


Figure 27 Men earning in the household

5.13 Employment Type

Employment Type	Formal		Informal		Chi-square Test
	Satellite Town	I-9/I-10	Dhoke Ratta	Eisa Nagri	
Job	78	68	39	30	X ² =147.1 Sig=0.012
Business	11	9	7	13	
Self-employed	1	13	25	40	
Staff	2	3	28	9	
Retired	2	4	1	4	
Student	6	3	-	4	
Mean	1.57	1.75	2.45	2.81	
Standard Deviation	1.35	1.31	1.29	1.35	

Table 17: Employment Type

In the table above, 40% of the respondents in Eisa Nagri are self-employed while 30% have jobs, 13% do business, and a negligible amount of 4% each is either a student or retired, whereas 9% belong to the staff. In I-9/I-10, 68% of respondents have jobs, 9% run businesses, and 13% are self-employed. In Dhoke Ratta, 39% of respondents have jobs, 25% are self-employed, 28%

belong to staff, and 7% run businesses. In Satellite Town, a significant number of 78% of respondents have jobs, and 11% run businesses. The value of Chi-square 0.012 shows a significant difference in all areas.

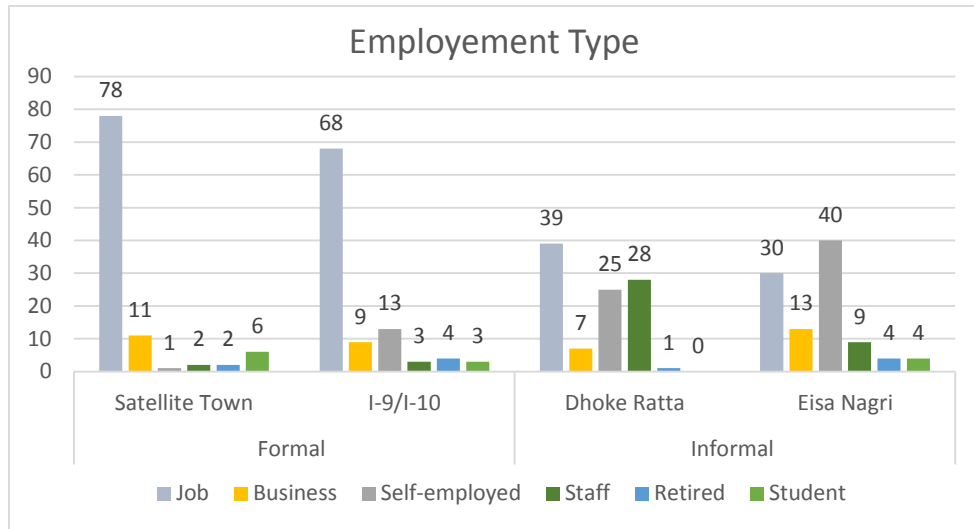


Figure 28 Employment type

5.14 Years Living in the Community

The number of years living in a community determines the strength of social ties. Stronger ties result in greater social capital.

Years Living in Community	Formal		Informal		Chi-Square Test
	Satellite Town	I-9/I-10	Dhoke Ratta	Satellite Town	
<=2	3	-	1	3	X ² =88.4 Sig=0.03
3-10	46	40	15	46	
11-18	31	35	25	31	
19-25	17	13	42	17	
26-33	3	9	10	3	
34+	-	3	7	-	
Mean	2.71	3	3.66	2.71	
Standard Deviation	0.89	1.08	1.1	0.89	

Table 18: Years Living in the community

In the table above, 53% of the respondents of Eisa Nagri have been living in the neighborhood for 11 to 18 years, 35% have been living for 3-10 years, and 12% have been living for 19-25 years. In I-9/I-10, 40% of the respondents lived in the neighborhood for 3-10 years, 35% of the respondents have been living for 11-18 years, and 13% have been living for 19-25 years. In Dhoke Ratta, 42% of the respondents have lived in the neighborhood for 19-25 years which is the highest in all four areas. 25% of the respondents have lived in the neighborhood for 11-18 years, and 15% of the respondents have been living for 3-10 years. In Satellite Town, 46% of the respondents have been living in the neighborhood for 3-10 years, 31% have been living for 11-18 years, and 17% for 19-25 years. The value of Chi-square 0.03 shows a significant difference among all four areas.

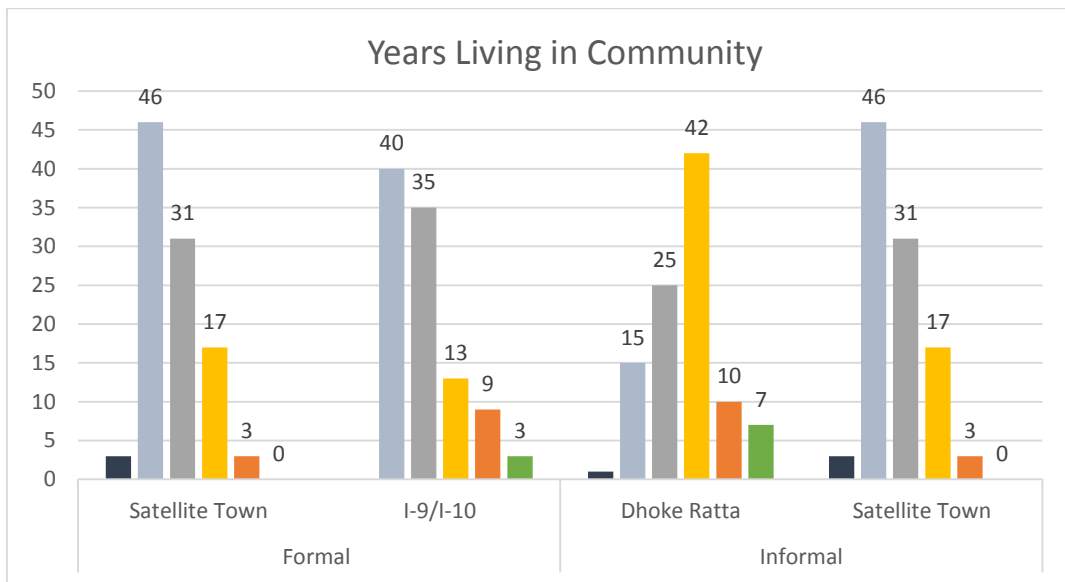


Figure 29 Years living in the community

5.15 Type of Dwelling

When dealing with disasters, the house ownership matters in research study because it can indicate to the level commitment that people will show in precautionary measures. Also, the house ownership shows the ratio of investment families will have in maintaining their houses.

Type of Dwelling	Formal		Informal		Chi-square Test
	Satellite Town	I-9/I-10	Dhoke Ratta	Eisa Nagri	
Owned	52	76	36	43	X ² = 0.170 Sig= 0.18
Rented	48	24	64	57	
Mean	1.48	1.24	1.54	1.57	
Standard Deviation	0.5	0.42	0.48	0.49	

Table 19: Type of Dwelling

In the table above, the majority (57%) of the respondents in Eisa Nagri are living in rented houses, while 43% of the respondents have their own homes. In I-9/I-10, 76% of the respondents have their own house while the rest of 24% live in a rented house. In Dhoke Ratta, the rented dwellings have a higher percentage with 64% and 36% of owned dwellings. In Satellite Town, the owned dwellings have a higher percentage with 52% and 48% of owned dwellings. Both informal settlements have a higher number of rented dwellings than formal settlements. The value 0.18 of Chi-square shows insignificant difference among the four areas.

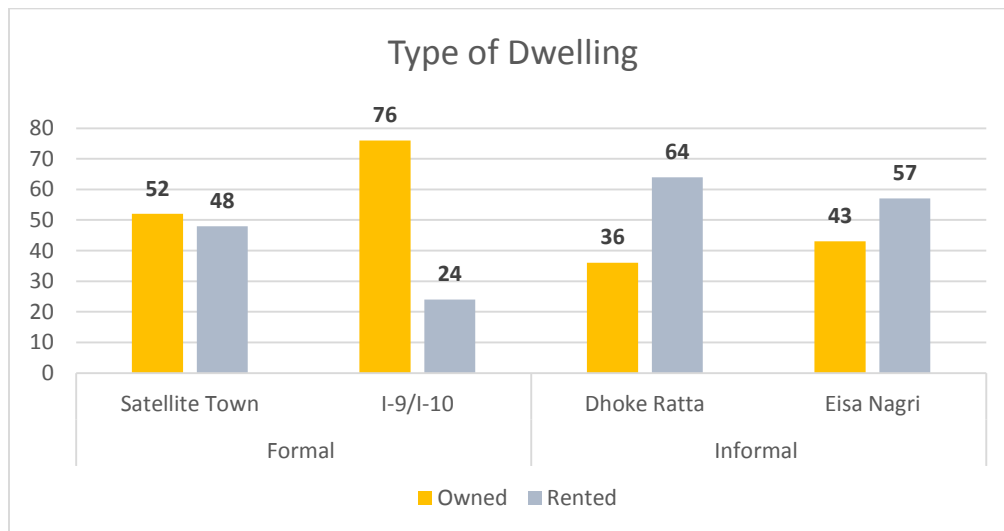


Figure 30 Type of dwelling

5.16 Type of Construction

Construction Type	Formal		Informal		Chi-square Test
	Satellite Town	I-9/I-10	Dhoke Ratta	Eisa Nagri	
Katcha	15	9	87	45	X ² =0.226 Sig=0.42
Pakka	85	91	13	55	
Mean	1.15	1.09	1.13	1.55	
Standard Deviation	0.35	0.28	0.34	0.5	

Table 20: Construction Type

The table above shows the construction type of the dwellings in all four areas. It is quite apparent that the informal settlements have a higher number of “katcha” dwellings than the formal settlements, with the percentage of 45% and 91% in Eisa Nagri and Dhoke Ratta, respectively. In contrast, the formal settlements have 9% and 15% of katcha dwellings. The value 0.42 of Chi-square shows insignificant difference among the four areas.

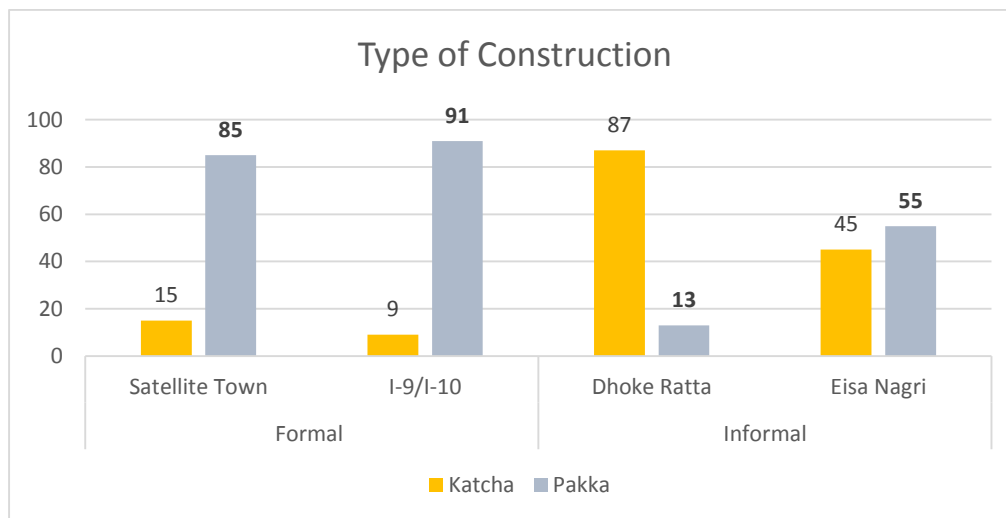


Figure 31 Type of construction

5.17 Type of Residence

Type of Residence	Formal		Informal		Chi-Square Test
	Satellite Town	I-9/I-10	Dhoke Ratta	Eisa Nagri	
Shared	18	24	47	53	X ² =0.321 Sig=0.41
Independent	82	76	53	47	
Mean	1.82	1.76	1.53	1.47	
Standard Deviation	0.38	0.42	0.5	0.5	

Table 21: Type of Residence

The table above shows that Eisa Nagri has a higher percentage (53%) of shared residence among the respondents. In I-9/I-10, 76% of the respondents have independent residence. In Dhoke Ratta, 53% of the respondents have independent residence, and in Satellite Town, 82% of the respondents have independent residence. The value of Chi-square shows insignificant difference among all areas.

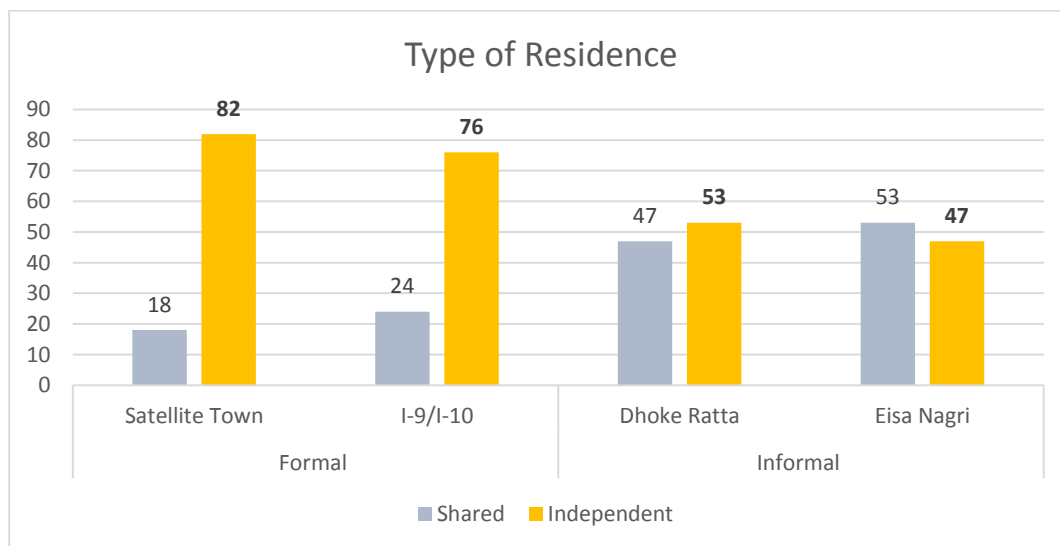


Figure 32 Type of residence

5.18 Family System

The type of Family life and system that one belongs to reflects heavily in their life choices and attitudes. A person's opinions and belief system are conducive to their impression of the family system and outlook of life. Majorly it is considered that in research work of social science, the element of the family system plays a critical role in study and analysis.

Family System	Formal		Informal		Chi-Square Test
	Satellite Town	I-9/I-10	Dhoke Ratta	Eisa Nagri	
Joint	19	18	54	44	X ² =43.8 Sig=0.26
Nuclear	81	82	46	56	
Mean	1.81	1.82	1.46	1.56	
Standard Deviation	0.39	0.38	0.5	0.49	

Table 22: Family System

In the table above, 56% of the respondents in Eisa Nagri have a nuclear family system. In I-9/I-10, 82% of the respondents have a nuclear family system. In Dhoke Ratta, 54% of the respondents have a joint family system, and in Satellite Town, 81% of the respondents have a nuclear family system. The Chi-square value of 0.26 shows insignificant difference in all areas.

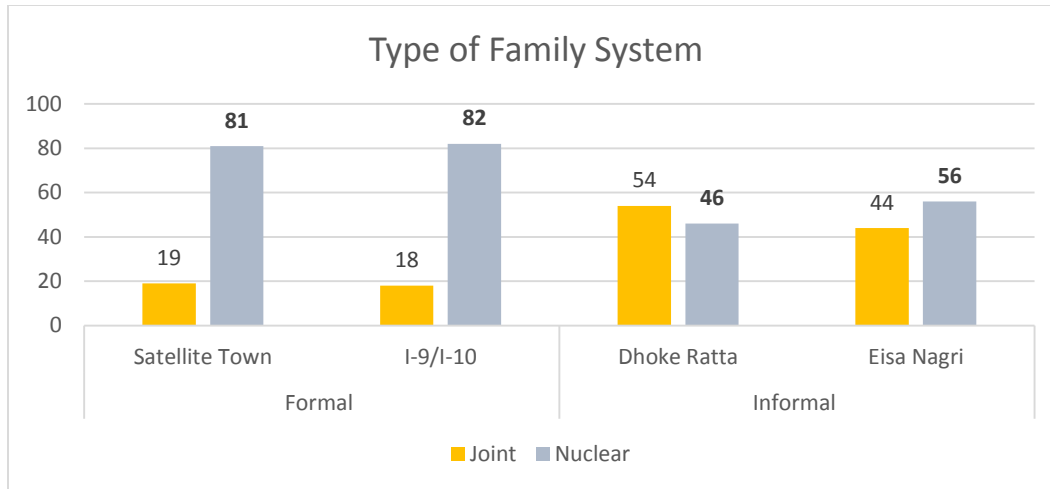


Figure 33 Family System

5.19 Job/Business in Community Vicinity

A person who works within the neighborhood he lives in is supposed to be more aware of the ins and outs of that community. He/She is supposed to be more connected to the people living in the community, and this may positively impact the social capital of that neighborhood.

Job/Business	Formal		Informal		Chi-Square Test
	Satellite Town	I-9/I-10	Dhoke Ratta	Eisa Nagri	
Yes	64	73	52	63	X ² =9.52 Sig=0.66
No	36	27	48	37	
Mean	0.64	0.73	0.52	0.63	
Standard Deviation	0.48	0.44	0.5	0.48	

Table 23: Job in the Community's Vicinity

According to the table, in Eisa Nagri, 63% of the respondents have jobs or businesses within the premises of their neighborhood, 73% in I-9/I-10, 52% in Dhoke Ratta, and 64% in Satellite Town. Moreover, the value of Chi-square 0.66 shows no significant difference among all four areas.

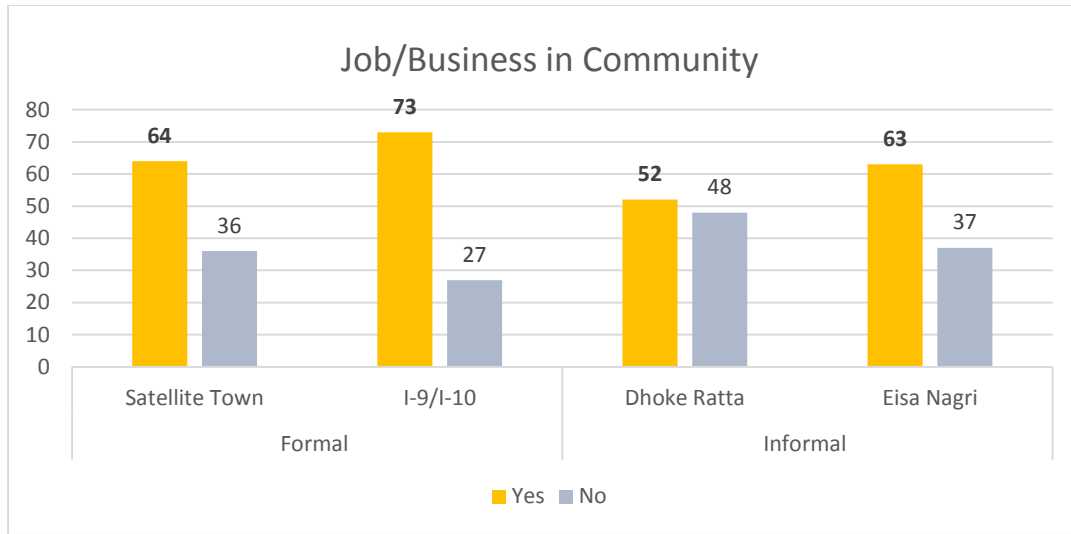


Figure 34 Job business in community vicinity

5.20 Experienced a Disaster

Disaster Experience	Formal		Informal		Chi-Square Test
	Satellite Town	I-9/I-10	Dhoke Ratta	Eisa Nagri	
Yes	25	12	59	69	X ² =90.9 Sig=0.03
No	75	88	41	31	
Mean	0.25	0.12	0.59	0.69	
Standard Deviation	0.43	0.32	0.49	0.46	

Table 24: Disaster Experience

The table above shows that 69% of respondents in Eisa Nagri have experienced a disaster, 12% in I-9/I-10, 59% in Dhoke Ratta, and 25% in Satellite Town. While 31% of the respondents in Eisa Nagri said they have not experienced a disaster, 88% in I-9/I-10, 41% in Dhoke Ratta, and 75% in Satellite Town. The value of Chi-Square shows a significant difference among all four areas.

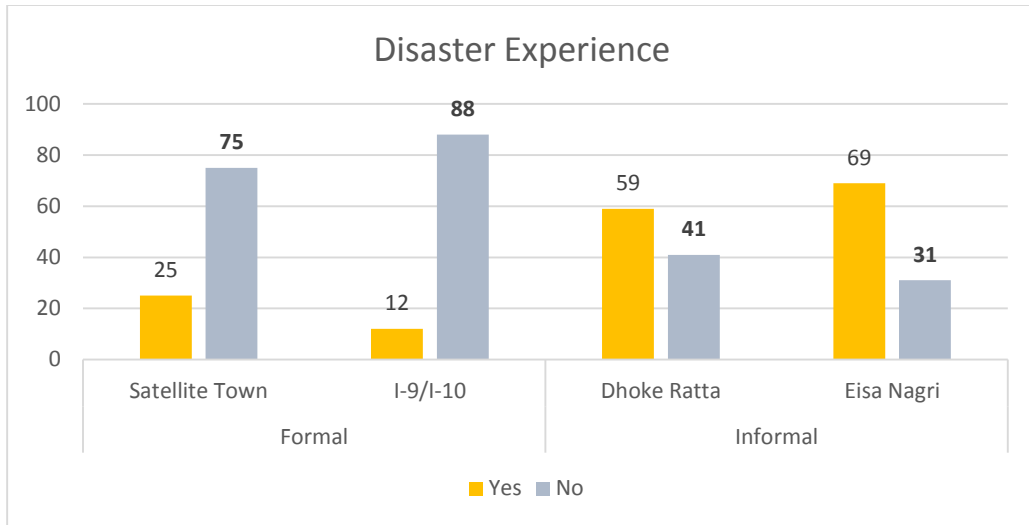


Figure 35 Disaster Experience

5.21 Type of Disaster

Disaster Experienced	Formal		Informal		Chi-Square Test
	Satellite Town	I-9/I-10	Dhoke Ratta	Eisa Nagri	
Earthquake	14	8	24	22	X ² =124.2 Sig=0.04
Flood	10	5	33	46	
Urban Fire	-	-	1	-	
Corona	-	-	-	1	
Unspecified	75	88	42	30	

Table 25: Disaster Type

The table above shows 46% of the respondents in Eisa Nagri have faced Floods, 5% in I-9/I-10, 33% in Dhoke Ratta, and 10% in Satellite Town. In Eisa Nagri, 22% of the respondents have face earthquakes, 8% in I-9/I-10, 24% in Dhoke Ratta, and 14% in Satellite Town. The value of Chi-Square 0.04 shows a significant difference among all four areas.

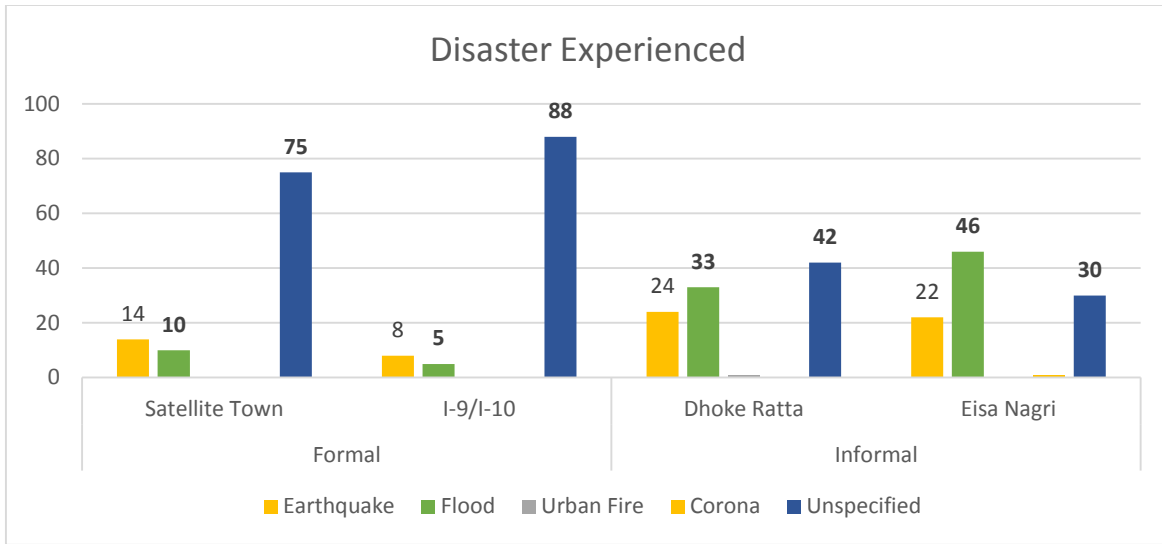


Figure 36 Disaster experienced

5.22 Disaster Risk Perception

People were asked about the perception of level of disaster risk in their community.

Disaster Risk	Formal		Informal		Chi-Square Test
	Satellite Town	I-9/I-10	Dhoke Ratta	Eisa Nagri	
Very low	11	5	30	27	X ² =68.92 Sig=0.01
Low	31	27	23	29	
Moderate	23	36	32	29	
High	21	22	13	12	
Very high	14	10	2	3	
Mean	0.59	0.61	0.46	0.47	
St. Deviation	0.25	0.21	0.22	0.22	

The table above shows that disaster risk perception is greater in formal settlements than informal settlements. The chi-square value of 0.01 shows a significant difference among all areas.

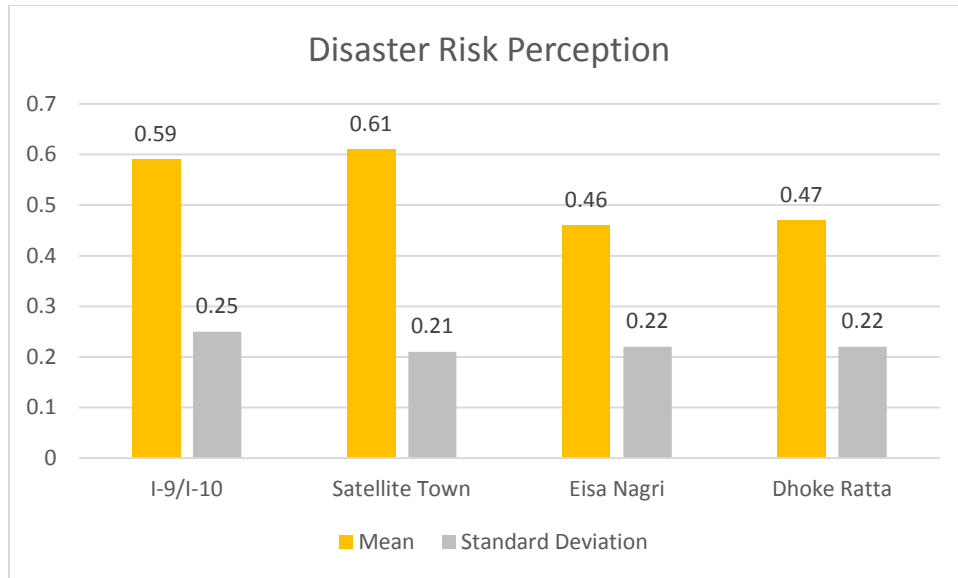


Figure 37 Disaster Risk Perception

5.23 Summary

Most of the respondents belong to the age group 28-37 years in all four areas, 39% in Eisa Nagri, 45% in I-9/I-10, 28% in Dhoke Ratta, and 39% in Satellite Town. In terms of gender, the male category dominated the survey in all areas. The majority of the respondents have an average income of around Rs. 50000 in Eisa Nagri, Satellite Town, and Dhoke Ratta. In I-9/I-10, the average income is around Rs. 90000. The dominating household size in I-9/I-10 and Dhoke Ratta is 2-4 persons. In Satellite Town it's 5-7 persons, and in Eisa Nagri, it's 8-10 persons. Dhoke Ratta has a higher value of the joint family system while the rest three have the dominant nuclear family system. Eisa Nagri and Dhoke have the highest value of respondents up to education level of matric, I-9/I-10 and Satellite Town have graduate-level dominant. Regarding disaster experience, Eisa Nagri and Dhoke Ratta have a higher percentage of respondents who have experienced a disaster, and the most experienced disaster is flooding.

Chapter 6

Network, Ties, and Trust among Formal Informal Settlements

6.1 Network Ties and Trust

Social capital can be defined as the resources embedded in the social connections (Lin N. , 2001). This dimension consists of indicators that have been used to quantify the strength of social connections and ties under the influence of a disaster.

6.2 Family's Support during Disaster

This indicator has been used to measure the familial support provided to the respondents during a disaster. The respondents were asked how frequently their family had supported them during a disaster.

Family Support in disaster			
	Formal	Informal	Chi-square
	Percentages		
Never	8	4.5	X ² =87.01 Sig=0.000
Rarely	29	8.5	
Sometimes	29.5	10.5	
Often	21.5	29	
Always	12	47.5	
Mean	0.6	0.81	
Standard Deviation	0.23	0.24	

Table 26 Family support in disaster

The table above shows that in formal settlements, the prevalent frequency of familial support lies between rarely and sometimes with 29% each. In contrast, in informal settlements, 29% of the respondents agree to have familial support often, while 47.5% of the respondents agree to always have familial support. The mean values 0.6 and 0.81 with chi-square value 0.000 depict a significant difference between both settlements.

This difference among both settlements may be attributed to the factor that in informal settlements, the joint family system is prevalent, with 47% of the households living in the joint family, while

in the formal settlements, only 19% of households live in joint family systems. Hence, the informal settlements respondents have greater familial support than the formal settlements during disasters.

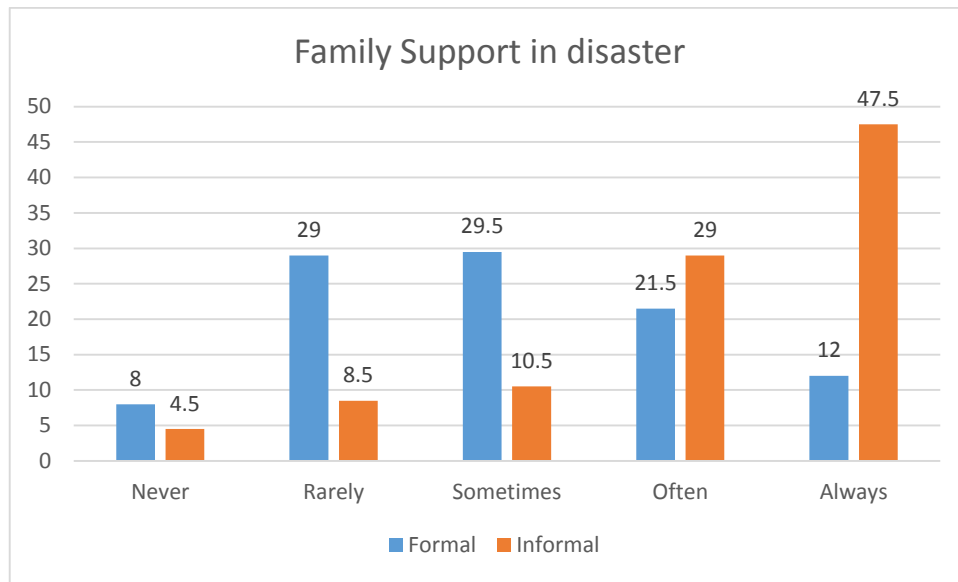


Figure 38 Family's support in disaster

6.3 Neighbor's Support in Disaster

This indicator has been used to measure the support provided by the neighbor to the respondents during a disaster. The respondents were asked how frequently their neighbors had supported/helped them during a disaster.

Neighbor's Support in disaster			
	Formal	Informal	Chi-square
	Percentages		
Never	10	7.5	X ² =41.06 Sig=0.000
Rarely	28	13.5	
Sometimes	36	23	
Often	24	38	
Always	5	18	
Mean	0.56	0.69	
Standard Deviation	0.21	0.23	

Table 27 Neighbor support during disaster

The table above shows that in formal settlements, 28% of respondents agree that their neighbors rarely support them during a disaster, 36% agree that their neighbors sometimes support them, and 24% agree that their neighbors often support them in disasters. In contrast, in informal settlements, 23% of the respondents agree that their neighbors sometimes support them, and 38% agree that their neighbors often support them in disasters. The mean value of 0.56 and 0.69 of formal and informal settlements, respectively, with a chi-square value 0.000, show a significant difference among both settlements.

The cause of this difference is associated with the aspect that in formal settlements, the residents relish their privacy and have little to no interaction with their neighbors on a daily basis. In contrast, in informal settlements, the neighbors are more involved in everyday routine. For instance, most of the women in the informal settlements are domestic workers. They usually work in the same neighborhood too. They may leave for and return from their workplaces together. Similarly, most laborers in the informal settlements leave together to find work daily. This increases their frequency of interaction, and they become more aware of their neighbors' ongoing circumstances or issues. Therefore, when in crisis, they easily turn to their neighbors for support.

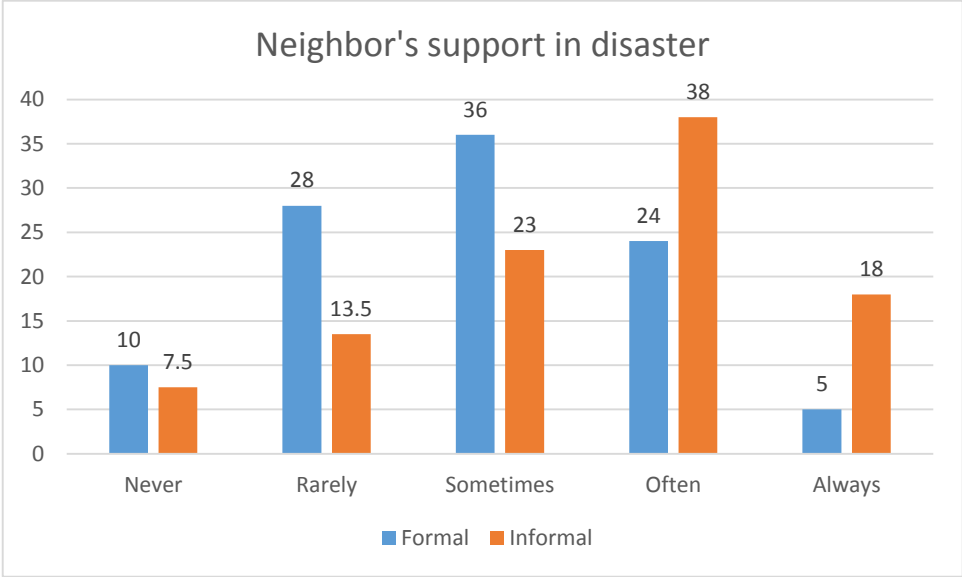


Figure 39 Neighbor's Support in disaster

6.4 Community's Support during Disaster

This indicator has been used to measure the support provided by the community to the respondents during a disaster. The respondents were asked how frequently their community had supported/helped them during a disaster.

Community Support in disaster			
	Formal	Informal	Chi-square
	Percentages		
Never	10	7	X ² =21.46 Sig=0.000
Rarely	28.5	19.5	
Sometimes	39	30.5	
Often	18.5	30	
Always	4	13	
Mean	0.56	0.65	
Standard Deviation	0.19	0.22	

Table 28 Community support during disaster

The table above shows that in formal settlements, 28.5% of respondents rarely have the support of their community during a disaster, and 39% of respondents sometimes have the support of their community during disasters, whereas in informal settlements, 30.5% of respondents sometimes have the support of their community during a disaster and 30% of respondents often have the support of their community during disasters, the mean values 0.56 and 0.65 with a chi-square value of 0.000 show significant difference among both settlements.

This difference can be because the residents of formal settlements prefer to live in isolation, despite the fact that formal settlements have more public spaces yet they have less daily interaction. This leads to weak social ties in the community. While in the informal settlements, the elderlies prefer to sit outside their homes in the street, and children play outside more often. This increases the day-to-day interaction of the residents and leads to stronger social ties. Therefore, informal settlements have more community support than formal settlements.

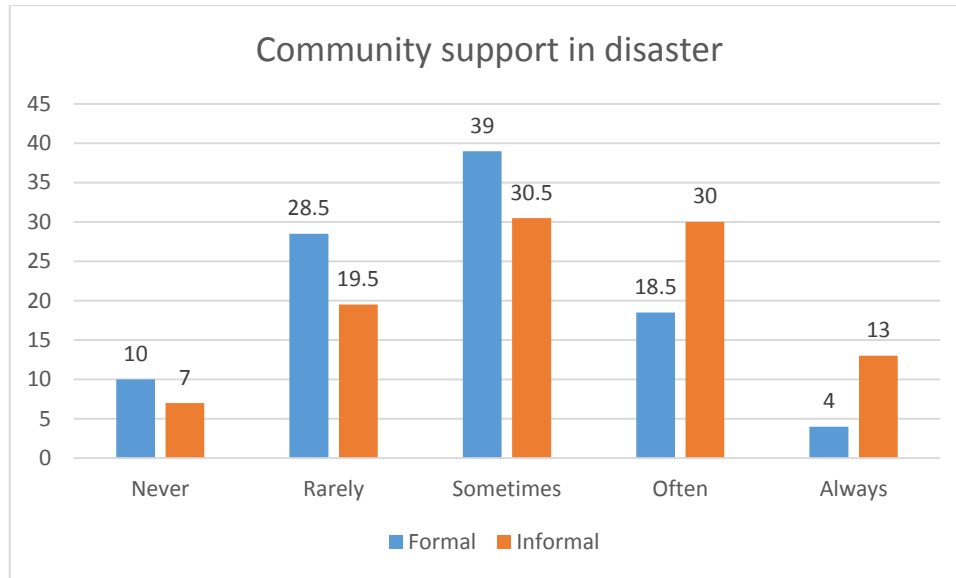


Figure 40 Community Support in disaster

6.5 Financial Aid by a Neighbor during Disaster

This indicator has been used to calculate the number of times the respondents have been provided financial aid by their neighbors during a disaster. The respondents were asked how frequently their neighbor had provided financial aid to them during a disaster.

Financially aided by neighbor in disaster			
	Formal	Informal	Chi-square
	Percentages		
Never	10	11.5	X ² =45.14 Sig=0.000
Rarely	26	11	
Sometimes	29	16	
Often	24	25.5	
Always	11	35.5	
Mean	0.6	0.73	
Standard Deviation	0.23	0.27	

Table 29 Financial aid by neighbor during disaster

The table above shows that 26% of the respondents of the formal settlements have rarely been financially aided by their neighbor during a disaster, 29% of the respondents have sometimes been financially aided by their neighbor during a disaster, and 24% of the respondents have often been financially aided by their neighbor during disasters whereas in informal settlements, 25.5% of the respondents have often been financially aided by their neighbor during a disaster and 35.5% of the

respondents have always been financially aided by their neighbor during disasters. The mean values 0.6 and 0.73 with chi-square value 0.000 show significant differences among both settlements.

Here it is noteworthy that the household income of informal settlements is less than the formal settlements, yet they are more inclined to assist their neighbor financially. This may be because the people are more socially connected and aware of each other in informal settlements.

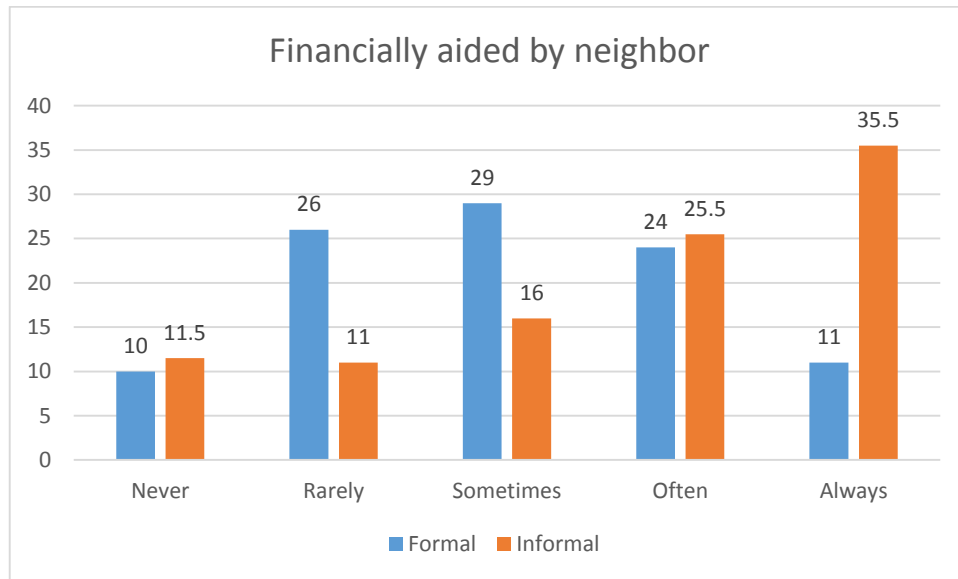


Figure 41 Financially aided by neighbor

6.6 Financial Aid by CBOs/NGOs during Disaster

This indicator has been used to calculate the number of times the respondents have been provided financial aid during a disaster by a CBO/NGO. The respondents were asked how frequently the CBOs/NGOs had provided financial aid to them during a disaster.

Financially aided by CBO/NGO in disaster			
	Formal	Informal	Chi-square
	Percentages		
Never	15.5	19.5	X ² =25.46 Sig=0.000
Rarely	30.5	17	
Sometimes	34	24.5	
Often	14	31.5	
Always	6	7.5	
Mean	0.52	0.58	

Standard Deviation	0.21	0.25	
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Table 30 Financial aid by CBO/NGO during disaster

The table above states that 30.5% of the respondents of the formal settlements have rarely been financially aided by a CBO or NGO during a disaster, and 34% of the respondents have sometimes been financially aided by a CBO or NGO during a disaster, whereas in informal settlements, 24.5% of the respondents have sometimes been financially aided by a CBO or NGO during a disaster and 31.5% of the respondents have often been financially aided a CBO or NGO during a disaster. The mean values 0.52 and 0.58 with chi-square value 0.000 show a significant difference among both settlements.

This difference may arise because the number of non-governmental organizations or civic-based organizations in informal settlements is greater than the formal settlements. At the same time, the mean values also indicate a moderate level of financial aid by the existing CBOs or NGOs.

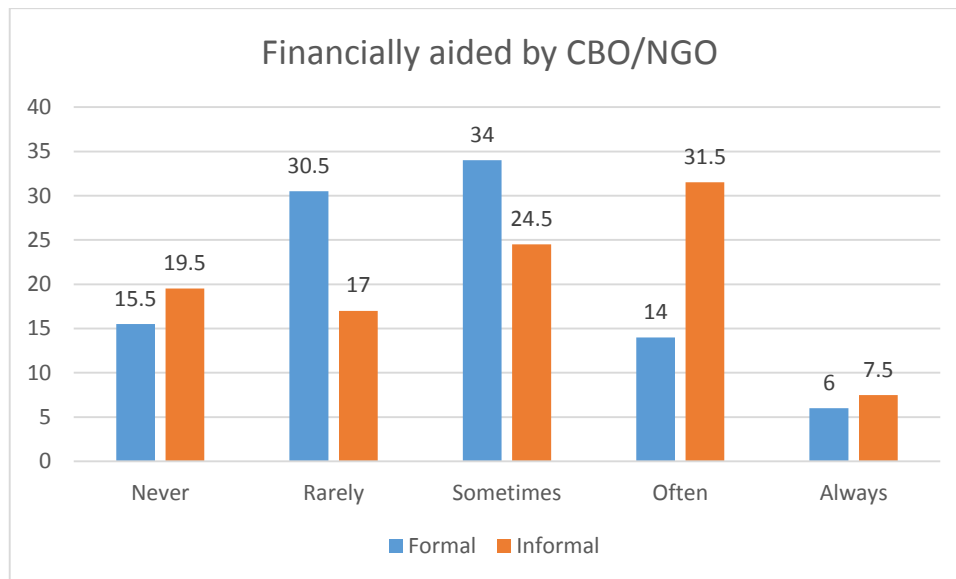


Figure 42 Financially aided by CBO/NGO

6.7 Financial Aid by Public Institution during Disaster

This indicator has been used to calculate the number of times the respondents have been provided financial aid during a disaster by public institutions. The respondents were asked how frequently the public institutions had provided financial aid to them during a disaster.

Financially aided by institutions in disaster			
	Formal	Informal	Chi-square
	Percentages		
Never	24	27.5	X ² =0.897 Sig=0.925
Rarely	28.5	25.5	
Sometimes	32	32.5	
Often	13	12	
Always	2.5	2.5	
Mean	0.48	0.47	
Standard Deviation	0.21	0.22	

Table 31 Financial aid by public institutions

The table above depicts a similar pattern of provision of aid by the public institutions in both types of settlements where 24% and 27.5% of the respondents in both types of settlements have never been financially aided by the institutions, 28.5% and 25.5% have rarely been financially aided by the institutions. In comparison, 32% and 32.5% have sometimes been financially aided by the institutions. The mean values are 0.48 and 0.47 and the chi-square value 0.925 is greater than 0.05 which show no significant difference among both type of settlements.

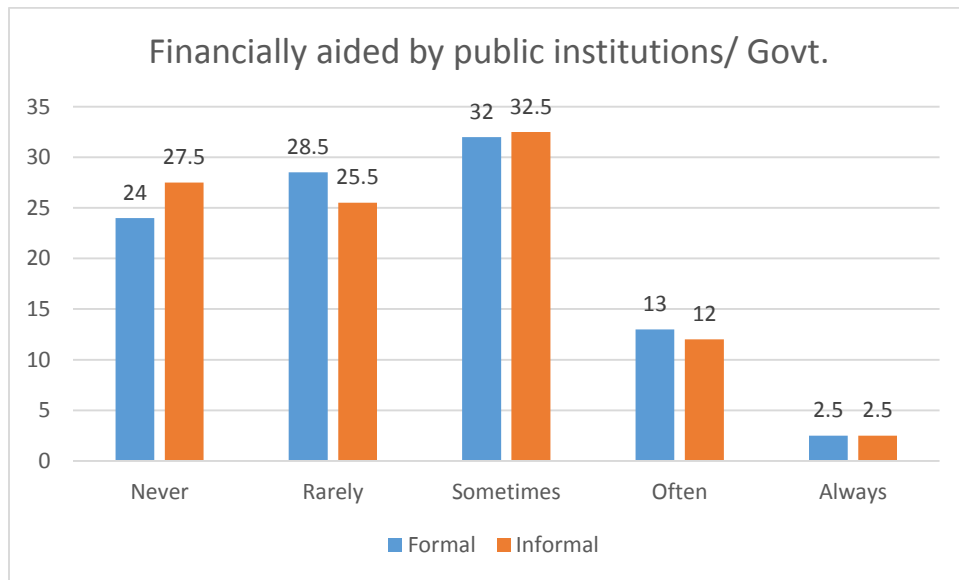


Figure 43 Financially aided by Govt/Inst.

6.8 Financial Aid by Politicians during Disaster

This indicator has been used to calculate the number of times the respondents have been provided financial aid during a disaster by a politician. The respondents were asked how frequently a politician had provided financial aid to them during a disaster.

Financially aided by politician			
	Formal	Informal	Chi Square
	Percentages		
Never	33	49	X ² =13.37 Sig=0.01
Rarely	26.5	23	
Sometimes	27.5	18.5	
Often	9.5	5	
Always	3.5	4.5	
Mean	0.44	0.38	
Standard Deviation	0.22	0.22	

Table 32 Financial aid by politician

The table above states that 33% of the respondents in the formal settlements have never been aided by a politician, 26.5% have rarely been aided financially, and 27.5% have sometimes been financially aided by a politician during a disaster, whereas 49% of the respondents in the informal settlements have never been financially aided by a politician during a disaster, 23% have rarely been aided, and 18.5% have sometimes been financially aided by a politician during a disaster. The mean value (0.44) of the formal settlements is greater than the mean value (0.38) of the informal settlements. The chi-square value of 0.01 indicates a significant difference between both types of settlements.

The role of a politician in society is significant as it enhances the linking social capital, as local decision-makers can be a source of potential assistance and advice (Aldrich & Ono, 2016). Here it is noteworthy that in both settlements, the overall aid by the politician lies at a low level according to the scale. The mean of the formal settlements is greater, indicating more aid as compared to the informal settlements. This may be because, in the past, a few politicians had used their resources and had brought aid to the community during a disaster.

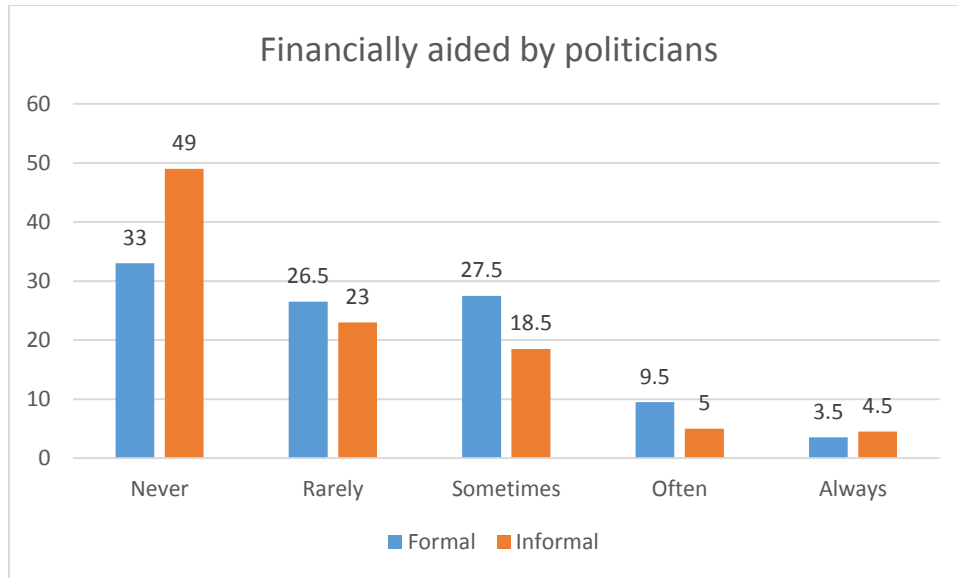


Figure 44 Financially aided by politicians

6.9 Sought Help while Stressed from my Network/Community

Social capital has several benefits both on a collective and individual level. It can become instrumental in overcoming adverse impacts of crisis or disaster by providing the individual with a sense of belonging, security, equity, purpose, etc., to uplift the psychological state of a stressed person (I. Kawachi & L.F. Berkman, 2001). This indicator, therefore, has been used to measure the frequency of respondents’ calls for help under stress from their social connections or community. The respondents were asked how many times they sought help from their social ties when they were stressed during a crisis or disaster.

Seek help in stress			
	Formal	Informal	Chi Square
	Percentages		
Never	11.5	11.5	X ² =30.51 Sig=0.000
Rarely	33.5	17.5	
Sometimes	33.5	25	
Often	14.5	29	
Always	7	17	
Mean	0.54	0.64	
Standard Deviation	0.21	0.23	

Table 33 Seek help when stressed

The table above states that in formal settlements, 33.5% of the respondents have rarely sought help when stressed, and 33.5% have sometimes sought help when stressed. In contrast, in the informal settlements, 25% of the respondents have sometimes sought help when stressed, and 29% of the respondents have often sought help when stressed.

As mentioned earlier, there are a number of reasons due to which the residents of the informal settlements are more socially connected. This increases social connection makes it easier for the residents to seek out help in distress.

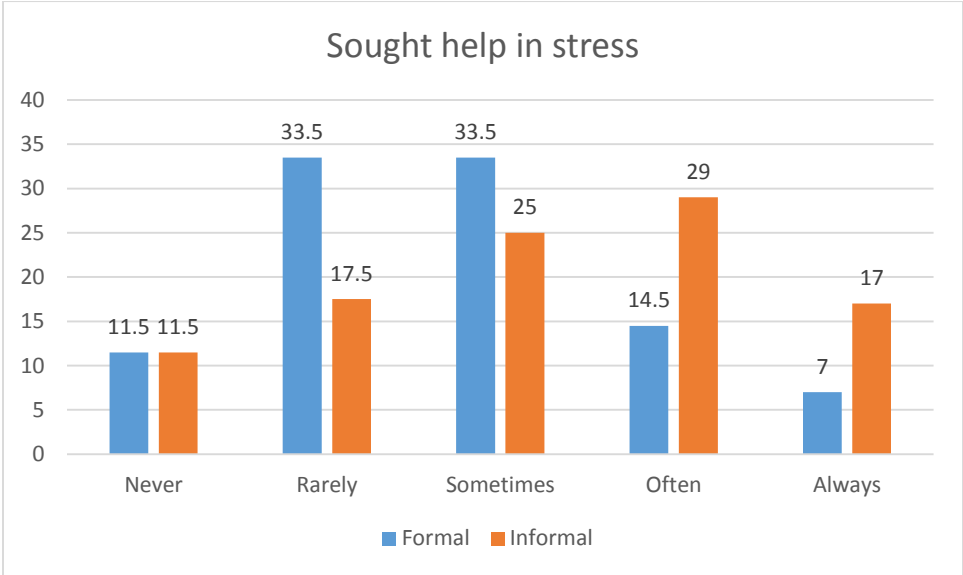


Figure 45 Seek help in stress

6.10 Entertained Visitors in my Household

This indicator has been used to measure how convivial and hospitable the environment of a neighborhood is. The respondents were asked how frequently they had entertained visitors from their community in their household (both new and old neighbors/community members).

Entertained visitors in house			
	Formal	Informal	Chi Square
	Percentages		
Never	6.5	4.5	X ² =64.12 Sig=0.000
Rarely	27.5	11.5	
Sometimes	39.5	18	
Often	18	41	
Always	8.5	25	
Mean	0.58	0.74	
Standard Deviation	0.2	0.22	

Table 34 Entertained visitors in the household

The table above shows that 27.5% of the respondents in the formal settlements have rarely visited the sick or housebound in their neighborhood, and 39.5% have sometimes visited the sick or housebound in their neighborhood. In contrast, in the informal settlements, 41% of the respondents have often visited the sick, and 25% have always visited the sick or housebound in their community. The mean values of formal and informal settlements are 0.58 and 0.74, respectively. The chi-square value of 0.000 indicates a significant difference among both types of settlements.

This difference indicates that the social ties in the informal settlements are stronger. There is more cohesion in their social structure. This ultimately influences several outcomes. It makes the people aware of each other's problems. They are more willing to help each other. As society gets more connected, social capital increases.

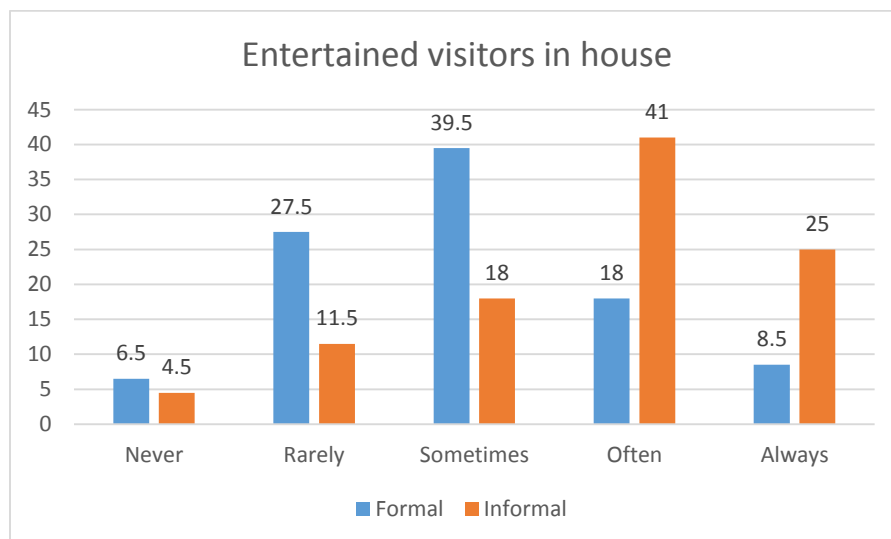


Figure 46 Entertained visitors in the house

6.11 Visited Sick or Housebound

This indicator has been used to determine how well the respondents are familiar with the conditions of their neighbors or community members. The respondents were asked how frequently they have visited the sick or housebound in their neighborhood.

Visited sick or housebound			
	Formal	Informal	Chi Square
	Percentages		
Never	6	7.5	X ² =80.04 Sig=0.000
Rarely	26	5.5	
Sometimes	41	19	
Often	19.5	42	
Always	7.5	26	
Mean	0.59	0.74	
Standard Deviation	0.19	0.22	

Table 35 Visited the sick or housebound

The table above shows that in the formal settlements, 26% of the respondents have rarely visited the sick or housebound in their neighborhood, and 41% have sometimes visited. In the informal settlements, 42% of the respondents have often visited the sick or housebound in their neighborhood, and 26% have always visited. The average of formal settlements (0.59) is less than the informal settlements (0.74), with a chi-square value of 0.000, indicating a significant difference among both types of settlements.

This indicates that the residents of the informal settlements are more informed and concerned about their neighbors' health and conditions. This factor contributes to the strengthening of the social structure of this neighborhood. Therefore, under crisis or disaster situations in the informal settlements, more people can count on their neighbors to help them out of their distress.

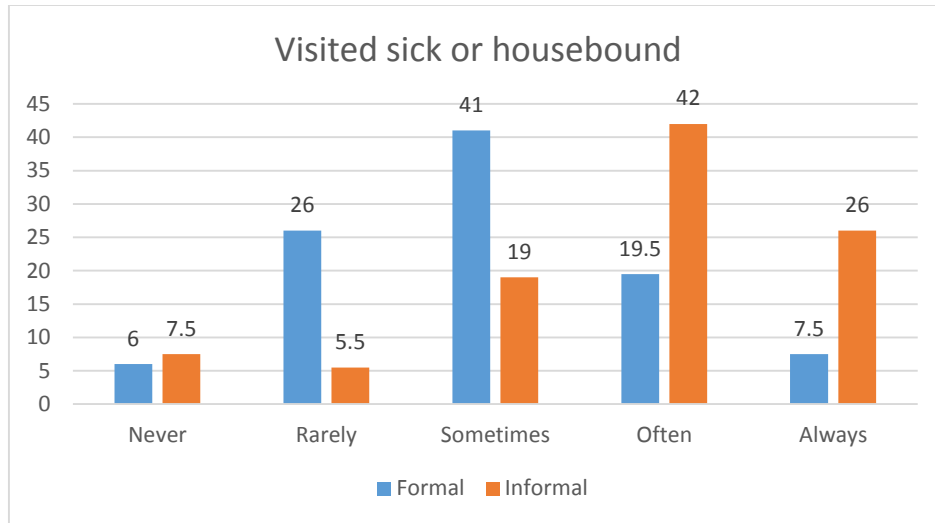


Figure 47 Visited sick or housebound

6.12 Responded to a Neighbor's Query

This indicator has been used to determine how supportive the respondents are of their neighbors. The respondents were asked how frequently they respond to their neighbor's query or call for help.

Responded to neighbor's query			
	Formal	Informal	Chi Square
	Percentages		
Never	9	6	X ² =47.88 Sig=0.000
Rarely	25	10	
Sometimes	35.5	23.5	
Often	24.5	34	
Always	6	26	
Mean	0.58	0.6	
Standard Deviation	0.21	0.25	

Table 36 Response to neighbor's query

In the table above, 25% of the respondents in the formal settlements have rarely responded to their neighbor's query or call for help, 35.5% have sometimes responded, and 24.5% have often responded. In contrast, in the informal settlements, 23.5% of the respondents have sometimes responded to their neighbor's query or call for help, 34% have often responded, and 26% have always responded to their neighbor's query or call for help. The mean values 0.58 and 0.6 with chi-square 0.000 show significant differences among both types of settlements.

As discussed in the above section, the residents of informal settlements are more socially connected to their neighbors. Therefore, they are more willing to help their neighbors out.

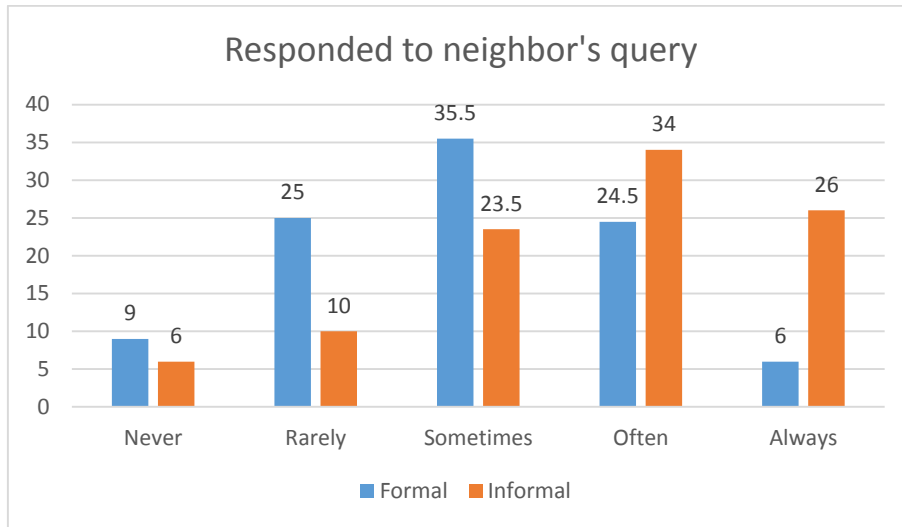


Figure 48 Responded to neighbor's query

6.13 Good Relations with the Community Members

This indicator has been used to determine how involved the respondents' family members are with their neighbors or community members. The respondents were asked how well they assumed their family members have relations with their neighbors or community members.

Good relations with neighbors			
	Formal	Informal	Chi Square
	Percentages		
Definitely not	6.5	6.5	X ² =35.72 Sig=0.000
Probably not	12.5	7	
Possibly	33.5	14.5	
Probably	34	38.5	
Definitely	13.5	33.5	
Mean	0.67	0.77	
Standard Deviation	0.21	0.23	

Table 37 Relation with the community members

In the table above, 33% of the respondents in formal settlements agree that their family members possibly have good relations with their neighbors or community members, and 34% of the respondents believe that their family members probably have good relations with their community members, whereas, in the informal settlements, 38.5% of the respondents agree that their family

members probably have good relations with their neighbors or community members and 33.5% of the respondents believe that their family members definitely have good relations with their neighbors or community members. The mean value of informal settlements is greater than the formal settlements indicating better social connections within the community.

Good relations with the community members mean a stronger social structure. Since the informal settlements have more percentage of good relations, it indicates that they have more social cohesion. It positively influences social capital. In a disaster scenario, these strong social connections may act as a catalyst to recovery (Hsueh, 2019).

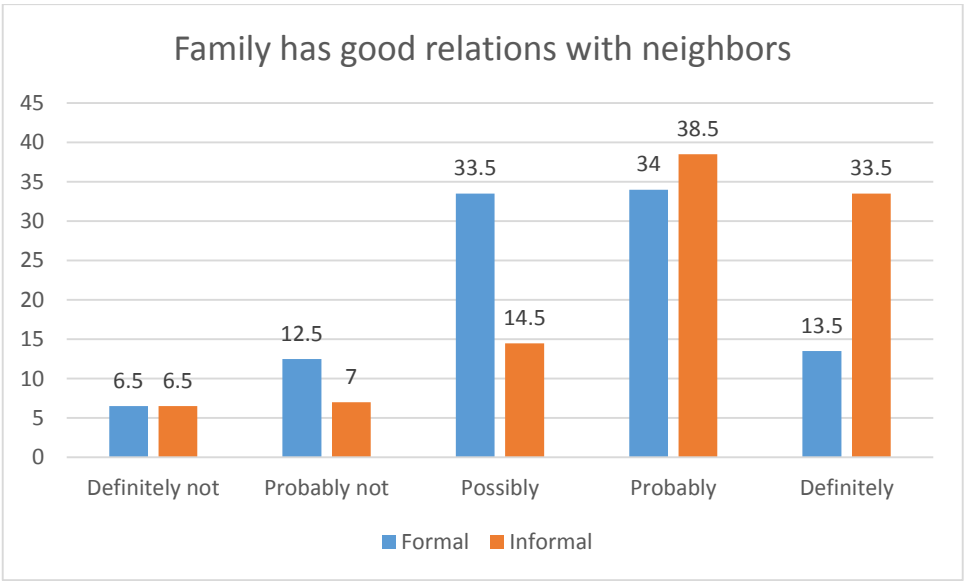


Figure 49 Good relations with neighbors

6.14 Trust in Family during Disaster

This indicator has been used to quantify trust in the community, which is the main component of cognitive, social capital. Trust is a component through which it is determined how social capital is perceived in a society (Flores et al., 2014). The respondents were asked whether they trusted their family to support them in disaster.

Trust in family during disaster			
	Formal	Informal	Chi Square
	Percentages		
Never	6.5	1	X ² =66.34 Sig=0.000
Rarely	10	2.5	
Sometimes	26.5	14.5	
Often	32.5	19.5	
Always	24.5	63.5	
Mean	0.7	0.88	
Standard Deviation	0.23	0.17	

Table 38 Trust in family

The table above states that in formal settlements, 26.5% of the respondents sometimes trust their family to support them during a disaster, 32.5% of the respondents often trust, and 24.5% always trust their family to support them in disaster. In contrast, in the informal settlements, 19.5% of the respondents often trust their family to support them during a disaster, and 63.5% always trust their family to support them in disaster. The mean values 0.7 and 0.88 of formal and informal settlements with a chi-square value of 0.000 indicates significant difference among both types of settlements.

This indicates that the perception of trust in the family to support in crisis or disaster is greater in informal settlements than formal settlements.

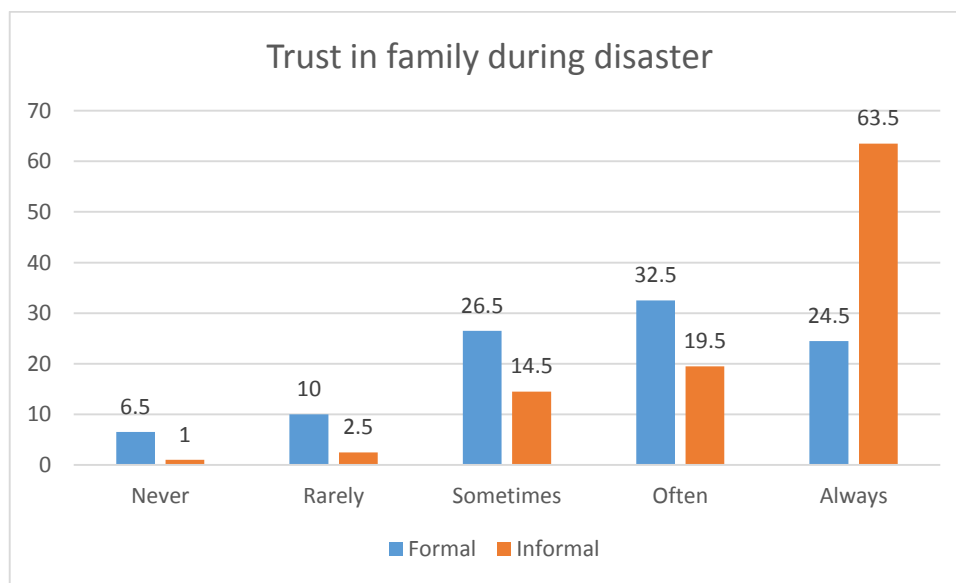


Figure 50 Trust in family

6.15 Trust in Neighbor during Disaster

This indicator has been used to quantify trust in neighbors to support in a disaster. The respondents were asked whether they trusted their neighbors to support them in disaster.

Trust in Neighbor during disaster			
	Formal	Informal	Chi Square
	Percentages		
Never	7	6.5	X ² =11.99 Sig=0.017
Rarely	18	13	
Sometimes	33	24.5	
Often	31.5	34.5	
Always	10.5	21.5	
Mean	0.64	0.7	
Standard Deviation	0.21	0.23	

Table 39 Trust in neighbor

The table above states that 33% of the respondents trust their neighbors to support them in disaster sometimes, and 31.5% of the respondents often trust their neighbors to support them during a disaster. In the informal settlements, 24.5% of the respondents trust their neighbor to support them in disaster sometimes, and 34.5% of the respondents often trust their neighbor to support them during a disaster, and 21.5% trust their neighbor always to support them in disaster. The mean values 0.64 and 0.7 with a chi-square value of 0.017 indicate a significant difference among both types of settlements.

This difference can be attributed to the factor that the people in the informal settlements are more known and aware of each other than the formal settlements, as the level of interaction in the formal settlements is low. Therefore, the residents of informal settlements place more trust in neighbors to support them during a disaster.

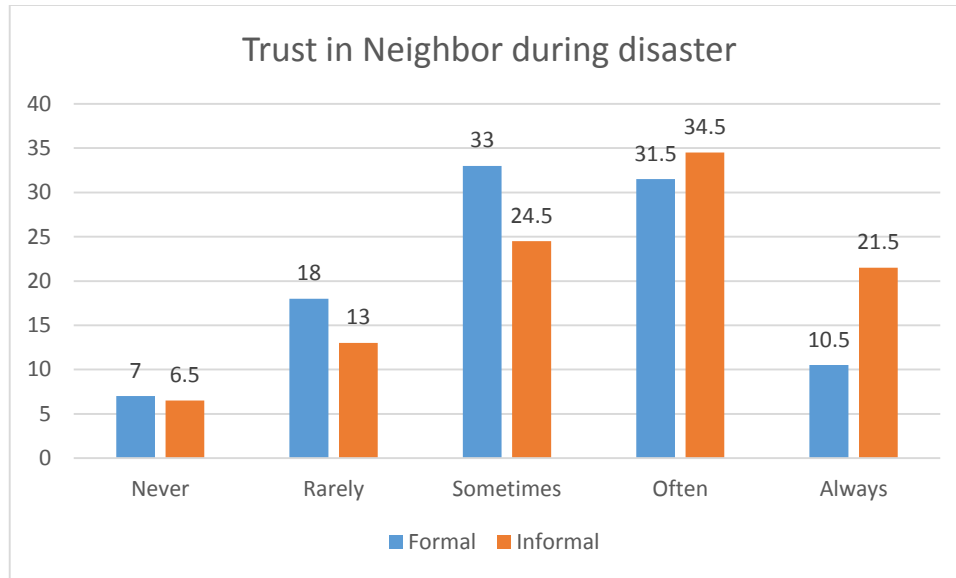


Figure 51 Trust in neighbor

6.16 Trust in Govt./Institutions during Disaster

This indicator has been used to quantify trust in institutions to support a disaster. The respondents were asked whether they trusted the institutions to support them in disaster.

Trust in govt./institutions during disaster			
	Formal	Informal	Chi Square
	Percentages		
Never	15	22	X ² =9.42 Sig=0.051
Rarely	30	22.5	
Sometimes	35.5	36	
Often	13	17	
Always	6.5	2.5	
Mean	0.53	0.51	
Standard Deviation	0.21	0.22	

Table 40 Trust in govt./ institutions

The table above states that in formal settlements, 30% of the respondents rarely trust the government or institutions to help them in disasters, and 35.5% of the respondents trust the government sometimes to help them during disasters. In the informal settlements, 22% of the respondents never trust the institutions, 22.5% rarely trust the institutions, and 36% of the respondents sometimes trust the institutions to help them in disasters. The mean values 0.53 and

0.51 with a chi-square value 0.051 greater than 0.05 indicate no significant difference among both types of settlements.

It can be concluded that the trust perception in the government or institutions among both types of settlements is low. During the past disasters, the government or institutions have made very little or no intervention, which is why they have been unable to gain the trust of the people. Moreover, it also indicates a weak linking social capital in both types of settlements.

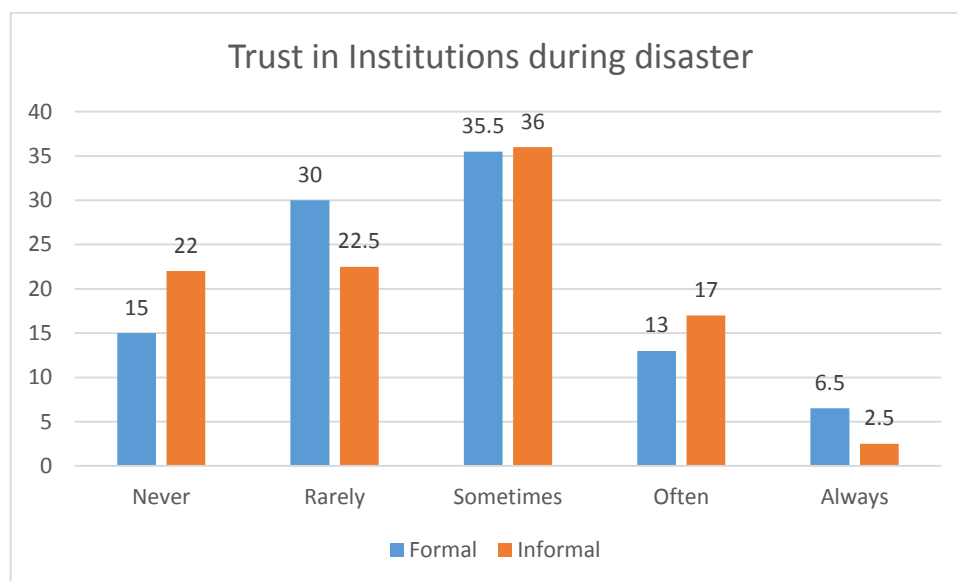


Figure 52 Trust in Govt/Institutions

6.17 Trust in NGOs/CBOs or politicians during a disaster

This indicator has been used to quantify trust in NGOs/CBOs or politicians to support in a disaster. The respondents were asked whether they trusted the NGOs/CBOs or politicians to support them in disaster.

Trust in CBO/NGO/politicians during disaster			
	Formal	Informal	Chi Square
	Percentages		
Never	30.5	34	X ² =5.81 Sig=0.213
Rarely	24	30	
Sometimes	27.5	25.5	
Often	13	7.5	
Always	5	3	
Mean	0.47	0.43	

Standard Deviation	0.23	0.21	
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Table 41 Trust in NGOs/CBOs/politicians

The table above states that in formal settlements, 30.5% of the respondents never trust a politician or NGO/CBO to help them in disaster, 24% rarely trust, and 27.5% of the respondents sometimes trust a politician or NGO/CBO to help them in disaster. Similarly, 34% of the respondents never trust a politician or NGO/CBO to help them in disaster, 30% rarely trust, and 25.5% of the respondents sometimes trust a politician or NGO/CBO to help them in disaster. The mean values 0.47 and 0.43 indicate a low level of trust, and the chi-square value of 0.213 is greater than 0.05, indicating no significant difference among both types of settlements.

The lack of difference and low level of trust indicates little or no effort by the concerned bodies to support the people during a disaster. Moreover, it also indicates a weak linking social capital in both types of settlements.

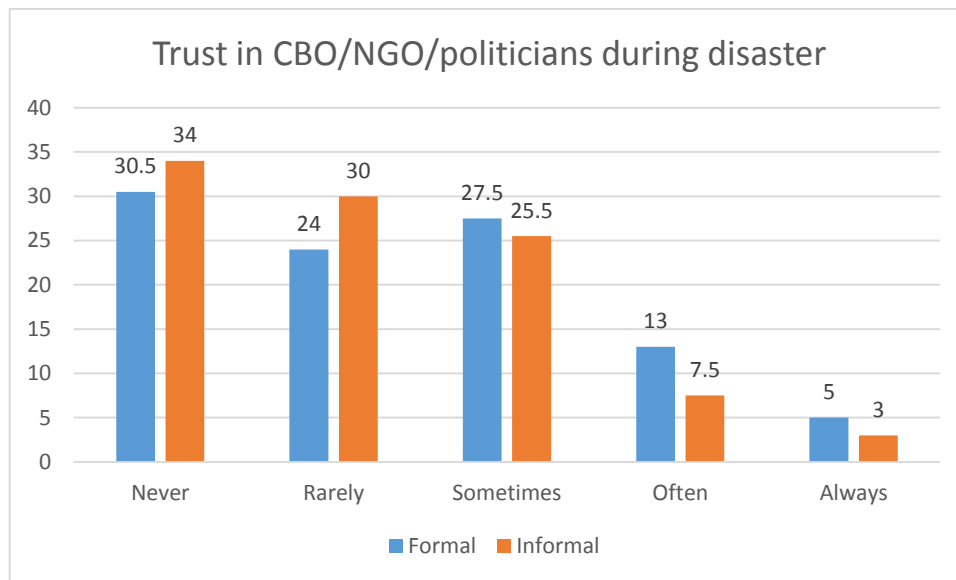


Figure 53 Trust in CBO/NGO/politicians

6.18 Summary

The difference in community support can be because the residents of formal settlements prefer to live in isolation. Despite the fact that formal settlements have more public spaces yet they have less daily interaction. This leads to weak social ties in the community. It is noteworthy that the household income of informal settlements is less than the formal settlements, yet they are more inclined to assist their neighbor financially. Here it is noteworthy that in both settlements, the

overall aid by the politician lies at a low level according to the scale. The mean of the formal settlements is greater, indicating more aid as compared to the informal settlements. This may be because, in the past, a few politicians had used their resources and had brought aid to the community during a disaster. Good relations with the community members mean a stronger social structure. Since the informal settlements have more percentage of good relations, it indicates that they have more social cohesion. It positively influences social capital. In a disaster scenario, these strong social connections may act as a catalyst to recovery.

Chapter 7

Civic and Political Participation among Formal Informal Settlements

7.1 Civic and Political Participation

The government and society are the important stakeholders in disaster management. Moreover, civic engagement and political participation play significant roles in enhancing the social capital of a society. The government has the foremost responsibility to provide aid and relief following a disaster and assist in bringing things back to normal. The government plays a pivotal role in disaster risk reduction, strengthening capacities, enhancing local government and community engagement to overcome natural disasters, and developing resilience within the community (Pathak & Ahmad, 2018). Civic engagement is one of the key factors of social cohesion. According to Putnam (2000), civic engagement in the form of voter turnout, participation in voluntary associations, training, and awareness programs are contributing factors of social capital.

7.2 Participation in CBOs related to Disaster

The level of participation of the community members in citizen-based organizations related to disasters is measured through this indicator.

Participation in CBOs			
	Formal	Informal	Chi Square
	Percentages		
Very Low	18	21	X ² =27.03 Sig=0.003
Low	37	18	
Moderate	33	33	
High	10	24	
Very High	3	5	
Mean	0.48	0.55	
Standard Deviation	0.19	0.23	

Table 42: Participation in CBOs

The table above shows that in formal settlements, participation in civic-based organizations is between low (37%) to moderate (33%). The participation of informal settlements lies dominantly

between moderate (33%) to high (24%). The mean value of informal settlements is greater than the formal settlements, with a 0.003 chi-square value indicating a significant difference in participation among both settlements.

The cause of greater participation in the informal settlements lies in the fact that one of the areas in the informal settlements is a Christian community. Therefore, this community has a number of civic organizations that perform under the authority of the local church. Although the average participation in CBOs in informal settlements lies at a moderate level, it is still greater than formal settlements.

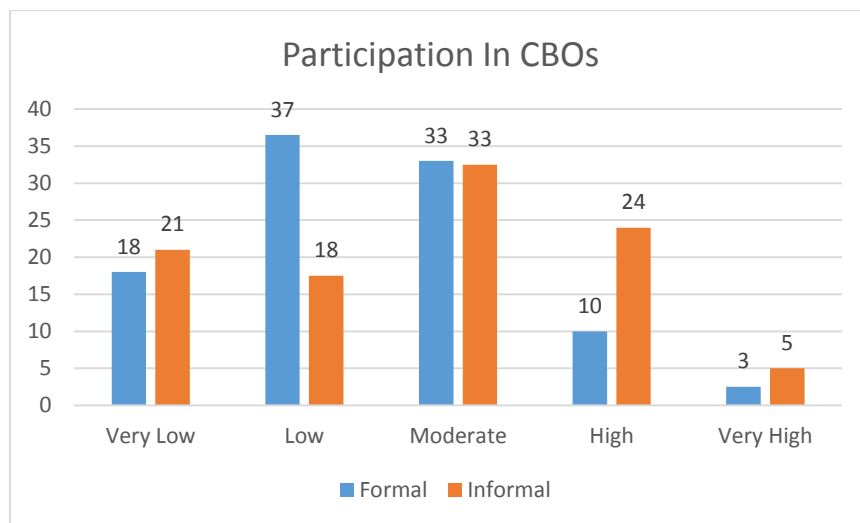


Figure 54 Participation in CBOs

7.3 Participation in NGOs related to Disaster

The non-governmental organizations in a community can be a source of self-mobilization, capacity building, provision of services, income generation, and community empowerment (Buckland, 1998). This indicator has been used to measure the participation of the respondents in NGOs that perform services related to disasters.

Participation in NGOs			
	Formal	Informal	Chi Square
	Percentages		
Very Low	15.5	21	X ² =11.29 Sig=0.023
Low	39.5	25.5	
Moderate	30.5	31	
High	13	19.5	

Very High	1.5	3
Mean	0.49	0.52
Standard Deviation	0.19	0.22

Table 43: Participation in NGOs

The table above shows that in the formal settlements, the greater number of participation is at a low level with 39.5%, followed by 30.5% at a moderate level. In contrast, in the informal settlements, the greatest level of participation is at a moderate level with 31%, 25.5% at a low level, and 21% at a very low level. On average, informal settlements have a higher level of participation than formal settlements, with a mean value of 0.52. The chi-square value of 0.023 depicts a significant difference among both settlements.

This difference arises because the Christian community (Eisa Nagri) comprises several international NGOs that provide aid to the community in crisis, while the rest of the areas have either no NGOs or only a handful that hardly ever come into action.

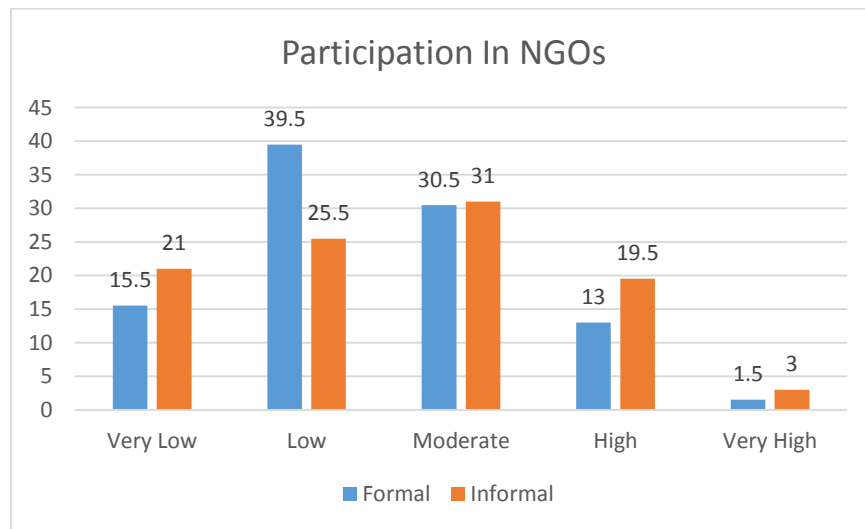


Figure 55 Participation in NGOs

7.4 Participation in Community Projects related to Disaster

This indicator has been used to measure the participation of the respondents in projects related to the disaster in the community. These projects may vary from disaster preparedness workshops such as the provision of sandbags, the building of levees, etc., to relief projects such as ration distribution, etc.

Participation in community disaster projects			
	Formal	Informal	Chi Square
	Percentages		
Very Low	16	23.5	X ² =8.68 Sig=0.07
Low	36.5	25	
Moderate	28	27	
High	14.5	19.5	
Very High	5	4.5	
Mean	0.51	0.51	
Standard Deviation	0.21	0.23	

Table 44 Participation in disaster Projects

The table above shows that in both settlements, the participation in disaster projects lies prevalently between low to moderate levels. The mean values of both settlements are the same, and the chi-square value of 0.07 is greater than 0.05. they are indicating no significant difference among both settlements.

When the respondents were asked about the disaster projects that were functional in their community, only a few people hinted at preparedness workshops and those in the formal settlements. They were either carried out as an exercise at their workplace or schools, whereas relief and ration distribution were carried out in both settlements, but the overall participation in the community projects was low to moderate.

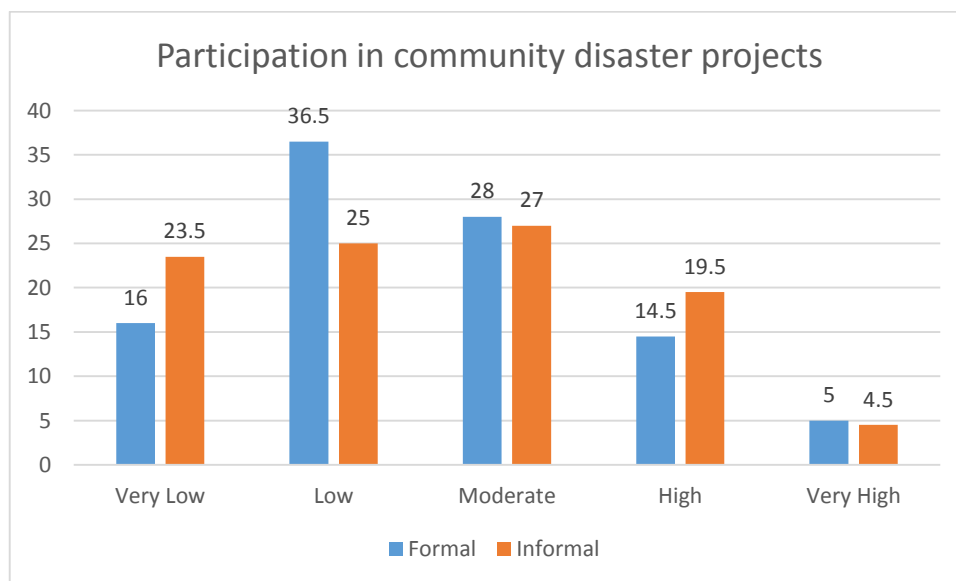


Figure 56 Participation in community projects

7.5 Interaction with a Politician or Official on Disaster-related Issues

Local officials or politicians can be of useful assistance under the circumstances of the disaster. Through their resources and links, local officials can address the crisis more efficiently since they are more aware and familiar with their community's needs and environment. A study concluded that the degree of damage in a community determines the local politicians' outreach to a broader circle of a useful network of resources (Aldrich & Ono, 2016). Therefore, this indicator has been used to measure the interaction of the respondents with a local politician or official regarding disaster-related issues or how much they think the officials are invested in their community's well-being following a disaster.

Interaction with a politician			
	Formal	Informal	Chi Square
	Percentages		
Very Low	16	42	X ² =38.95 Sig=0.000
Low	30	19	
Moderate	34	21	
High	16.5	17.5	
Very High	3.5	0.5	
Mean	0.52	0.43	
Standard Deviation	0.21	0.23	

Table 45 Interaction with a politician or official

The table above shows that the respondents of informal settlements have very low interaction (42%) with a politician or official regarding these disaster-related issues or crises. In the formal settlements, the respondents have a low (30%) to moderate (34%) level of interaction with a politician or official. The mean values of 0.52 and 0.43 suggest greater interaction with a politician or official in the formal settlements than the informal settlements. The chi-square value of 0.000 depicts a major significant difference among both settlements.

The respondents in the formal settlements have open access to the local official in their areas. They can easily take up their issues to them or can call on him/her for a joint session with the community members. In contrast, the informal settlements have little or no interaction with an official since the majority of the area of their settlements have encroached areas. The only officials who come to their doorstep or community warn them or take away the encroached land. Even when Eisa Nagri and Dhoke Ratta are inundated during the monsoon season, the officials do not interfere.

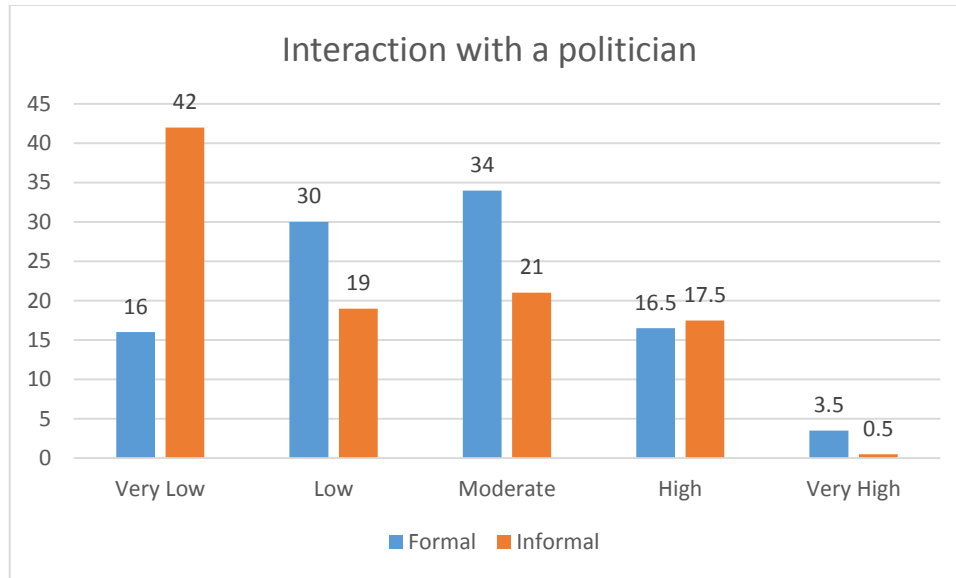


Figure 57 Interaction with a politician

7.6 Participation in Decision-making Process

The notion of participation of the local community in the decision-making process has now become the need of the hour in the developing world. Moreover, it is now considered an essential component for externally or privately funded projects. In disaster governance, the participatory approach in the decision-making process gains more significance because the locally residing members are more familiar with their community's socio-economic and geographic environment (Mubita et al., 2017). Therefore, this indicator has been used to measure the respondents' participation in the decision-making process regarding disasters.

Participation in decision-making			
	Formal	Informal	Chi Square
	Percentages		
Very Low	8.5	16	X ² =9.46 Sig=0.05
Low	15.5	20	
Moderate	39	32	
High	30.5	23.5	
Very High	6.5	8.5	
Mean	0.62	0.57	
Standard Deviation	0.21	0.24	

Table 46 Participation in Decision-making

The table above shows that in formal settlements, the participation in decision making is between moderate (39%) to high (30.5%) level, and the participation in informal settlements lies between low (20%) to moderate (32%). The chi-square value of 0.05 shows a significant difference in the mean values (0.62 & 0.57) of both settlements.

The participation of the respondents in formal settlements is greater as there are local officials who the people hold accountable. The people usually get together to highlight an issue in front of the local official. For instance, in I-10/4, a road that led to a public school got damaged due to the flooding in the nullah Lai. The officials paid no heed to its restoration, but all the neighbors in that area gathered and demanded that the road be restored to lift the hindrance caused to the students. That is how they participated in a decision that had to be made for them. In contrast, in the informal settlements, specifically in Eisa Nagri (Islamabad), there is no local official authority that carries out the decision-making process, only the eviction of the residents who have to build their homes on the government land.

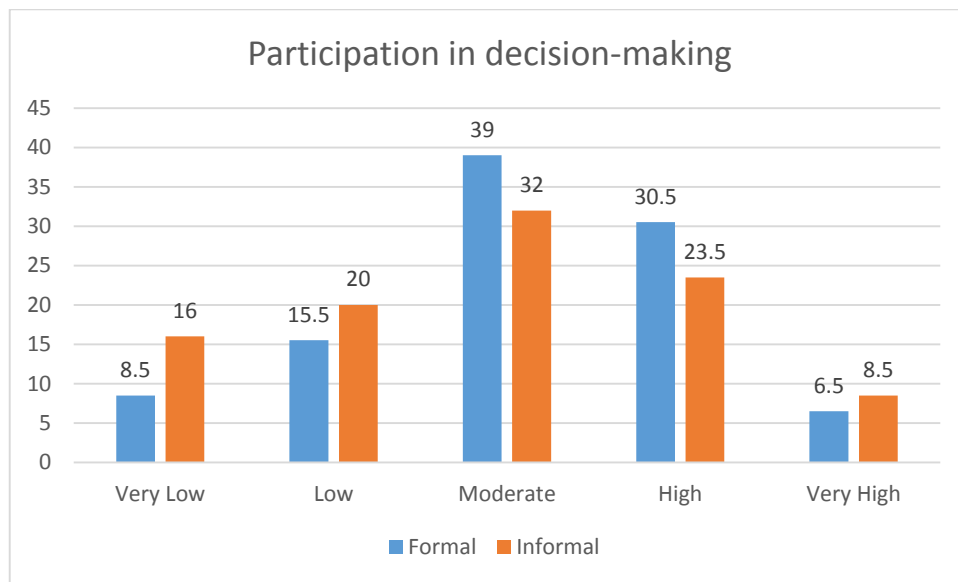


Figure 58 Participation in decision-making

7.7 Voted in the last election

Voter turnout is considered to be a strong indicator of social capital as it is a measure of collective action in a community (Putnam, 2000). This indicator has been used to measure voter turnout by accumulating the number of people who voted in the last election to quantify a component of social capital.

Voter turn-out			
	Formal	Informal	Chi Square
	Percentages		
No	20	38.5	X ² =3.93 Sig=0.05
Yes	80	61.5	
Mean	0.8	0.62	
Standard Deviation	0.41	0.35	

Table 47 Voter Turnout

The table above shows that 80% of respondents had voted in the last election in the formal settlements, and almost 40% of the respondents in the informal settlements did not vote in the last election. The value of chi-square shows a significant difference among both settlements. The mean values 0.8 and 0.62 depict that the respondents of the formal settlements are more responsible and have contributed to the social capital of their community by their collective action through casting their vote.

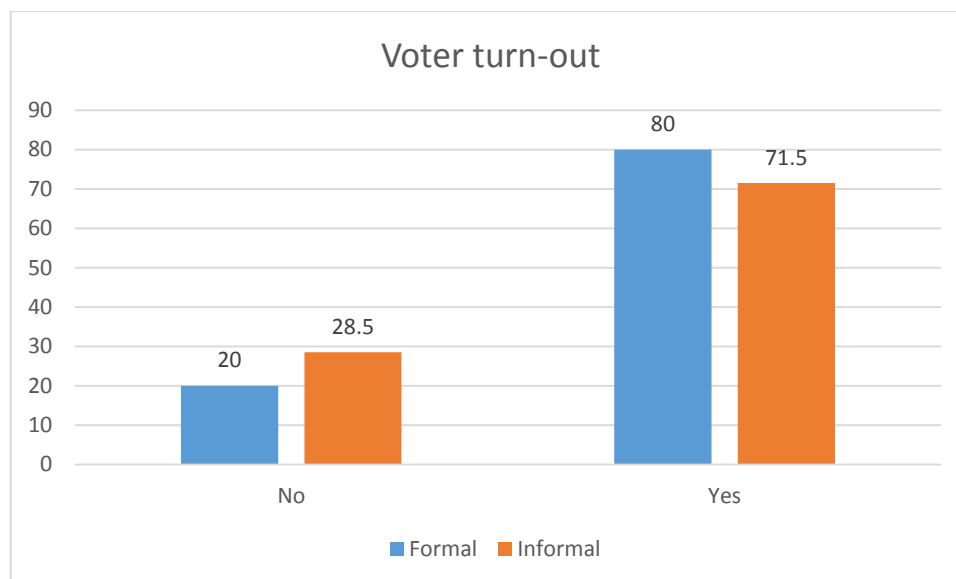


Figure 59 Voter turn-out

7.8 Provision of Loan by CBOs/NGOs

This indicator has been used to measure the number of times the respondents have been funded by a citizen-based organization or non-governmental organizations during a disaster.

Provision of Loan by NGO/CBO			
	Formal	Informal	Chi Square
	Percentages		
Very Low	16.5	18.5	X ² =26.08 Sig= 0.000
Low	33	16	
Moderate	34.5	31	
High	13.5	28	
Very High	2.5	6.5	
Mean	0.5	0.57	
Standard Deviation	0.2	0.24	

Table 48 Provision of Loan by CBOs/NGOs

The table above shows that the frequency with which the respondents of formal settlements have been provided a loan by CBOs/NGOs is between low (33%) to moderate (34.5%). The level of provision of loans by NGOs/CBOs in the informal settlements lies between moderate (31%) to high (28%). The value of chi-square 0.000 shows a major significant difference between the means of both settlements.

The greater mean value of informal settlements indicates that a greater number of people have been provided loans by NGOs and CBOs. Since these areas are squatter settlements, the residents live in extremely impoverished conditions. Several NGOs fulfill the role of providing aid and relief to the affected areas in Islamabad and Rawalpindi, such as Khushaal Pakistan, that provides relief to flood-hit areas.

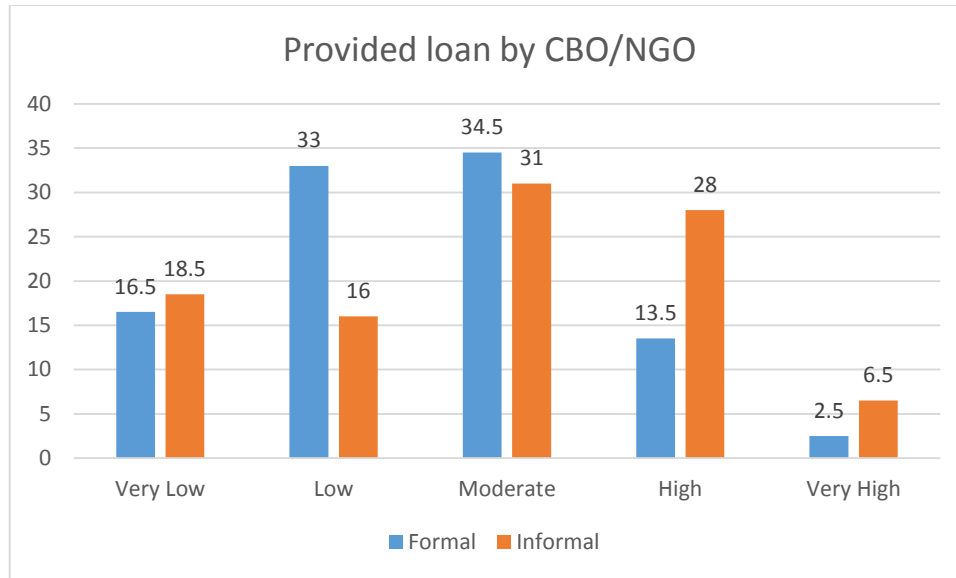


Figure 60 Provided loan by CBO/NGO

7.9 Funded for Damage Repair of a Public/Community Place

This indicator has been used to measure the number of times the respondents have funded for the damage repair of a public space following a disaster.

Funded for damage repair			
	Formal	Informal	Chi Square
	Percentages		
Very Low	15.5	21	X ² =24.98 Sig=0.000
Low	30.5	20.5	
Moderate	39.5	26	
High	11	25.5	
Very High	3.5	7	
Mean	0.51	0.55	
Standard Deviation	0.19	0.24	

Table 49 Funded for Damage repair

The table above shows that in formal settlements, the level of funding for damage repair is between low (30.5%) and moderate (39.5%), whereas in the informal settlements, the level of funding for damage repair almost 42% from very low to low and 52% from moderate to high. The mean value of the informal settlements is greater than the formal settlements, and chi-square 0.000 shows a significant difference among both settlements.

Here, it is significant to note that the income bracket of informal settlements is between Rs 10,000 to Rs 50,000. Yet, it has a greater percentage of funding for damage repair in their community. The cause identified was that these are squatter settlements, and there is no role local officials or governing bodies to look after the needs of the people. Hence, people solely rely on self-help.

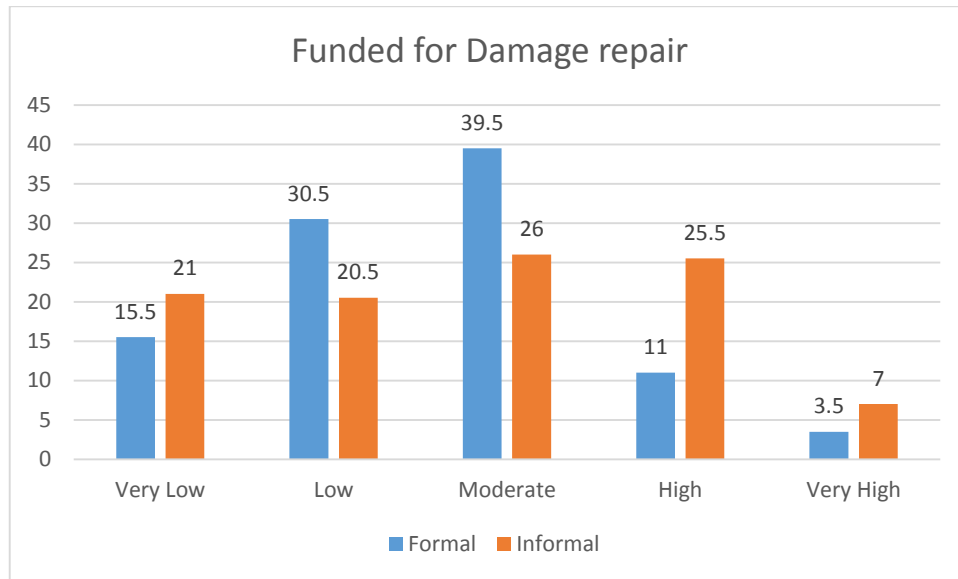


Figure 61 Funded for damage repair

7.10 Provided Shelter in Disaster

This indicator has been used to measure the number of times the respondents have provided shelter to the people in crisis.

Funded for damage repair			
	Formal	Informal	Chi Square
	Percentages		
Very Low	12	10.5	X ² =30.46 Sig=0.000
Low	25.5	15.5	
Moderate	35	21	
High	17.5	40	
Very High	10	13	
Mean	0.57	0.65	
Standard Deviation	0.23	0.23	

Table 50 Provision of Shelter

The table above shows that the frequency with which the respondents of the formal settlements have provided shelter to the people affected by a crisis or disaster lies predominantly between low (25.5%) to moderate (35%). In the informal settlements, 40% of the respondents have a high frequency of providing shelter to the people in need, and 21% have a moderate frequency. The mean values suggest that a greater number of people have provided shelter in informal settlements than formal settlements. The chi-square value of 0.000 also suggests a significant difference between both settlements.

Although the physical attributes of the built environment of formal settlements are far better than the informal settlements, yet the people in the informal settlements are more inclined to provide shelter to the people in need. This may be attributed to the fact that people in the informal settlements are more connected and aware of each other’s problems. The individual himself is more willing to seek help.

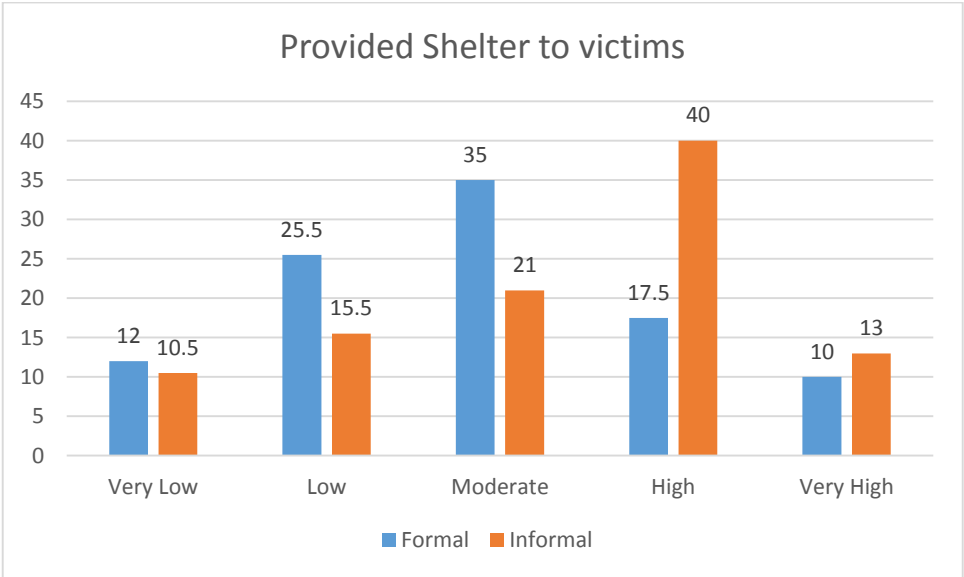


Figure 62 Provided shelter to victims

7.11 Helped your Community Member in the form of Material Things

This indicator has been used to calculate the number of times the respondents have helped their community members in the form of material things such as clothes, food, books, furniture, etc.

Helped with material/goods			
	Formal	Informal	Chi-square
	Percentages		
Very Low	12	10.5	X ² =30.46 Sig=0.000
Low	25.5	15.5	
Moderate	35	21	
High	17.5	40	
Very High	10	13	
Mean	0.57	0.65	
Standard Deviation	0.23	0.23	

Table 51 Helped with material things

The table above shows that in formal settlements, the level of helping community members is dominant between 25.5% at low and 35% at moderate, whereas in the informal settlements, the level of help is dominant between moderate (21%) and high (40%). The mean values suggest a greater number of help in the informal settlements, and the chi-square value of 0.000 supports this argument.

As mentioned earlier, the people in the informal settlements are more socially connected, so they tend to help each other more with food, clothes, etc., and other material things even though they have the least household income.

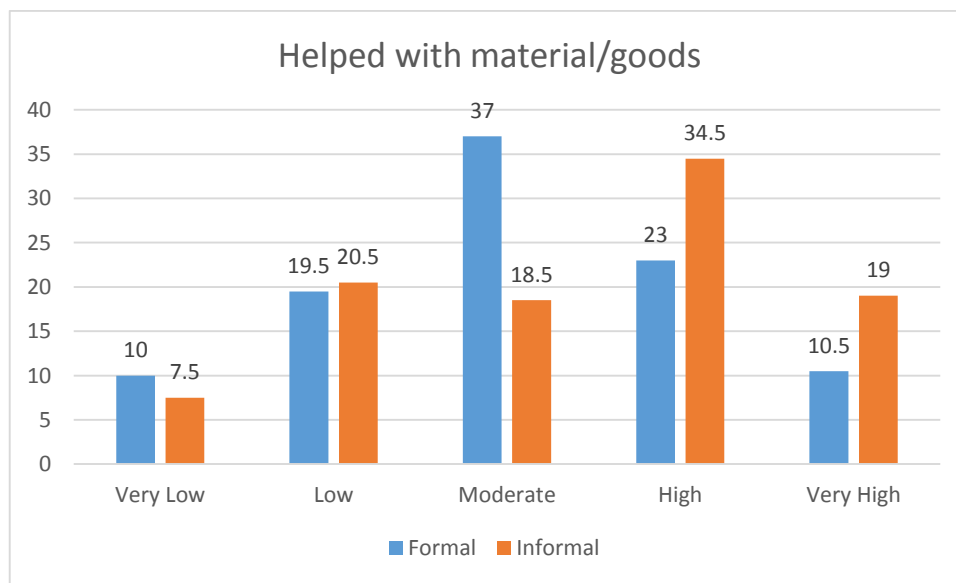


Figure 63 Helped with material things

7.12 Financially Helped Community Member in Crisis

This indicator has been used to calculate the number of times the respondents have financially helped their community members in crisis or disaster.

Financially aided in crisis			
	Formal	Informal	Chi-Square
	Percentages		
Very Low	13.5	18.5	X ² =13.82 Sig=0.008
Low	14	19.5	
Moderate	34.5	20.5	
High	22.5	30.5	
Very High	15.5	11.5	
Mean	0.63	0.59	
Standard Deviation	0.25	0.26	

Table 52 Financially helped a community member

In the table above, formal settlements have a moderate to a high level of helping financially in crisis. Similarly, the informal settlements have a moderate to a high level of helping financially in crisis. The chi-square value of 0.008 suggests a significant difference in both settlements, with formal settlements having a greater mean value indicating a greater number of financial assistance. This can be attributed to the financial variation in household income in both settlements. Since the formal settlements have a higher income bracket, they are more inclined to provide financial assistance.

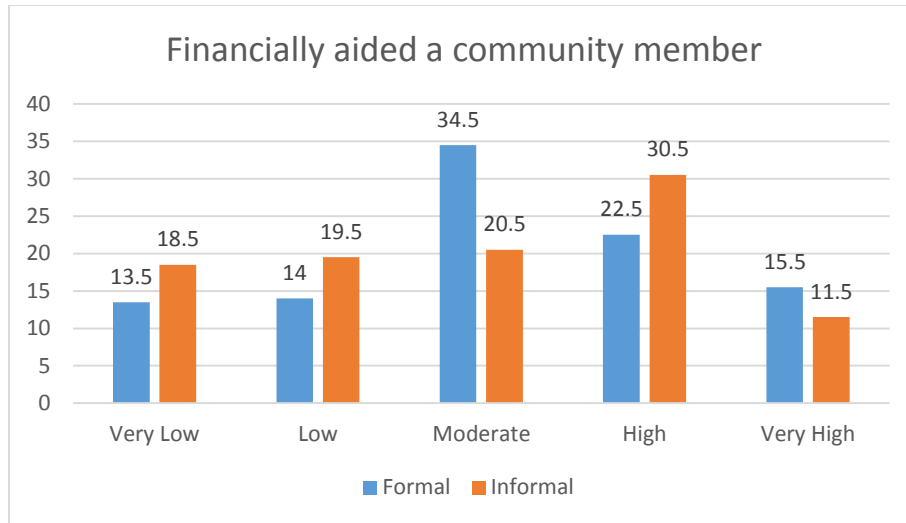


Figure 64 Financially aided by community members

7.13 Physically Helped Community Member in Crisis

This indicator has been used to calculate the number of times the respondents have physically helped their community members in a crisis or a disaster.

Physically aided in crisis			
	Formal	Informal	Chi-square
	Percentages		
Very Low	14.5	31	X ² =35.92 Sig=0.000
Low	20	30	
Moderate	32	15	
High	27	15	
Very High	6.5	9	
Mean	0.58	0.48	
Standard Deviation	0.23	0.26	

Table 53 Physically helped a community member

The table above shows that in formal settlements, the level of physically helping a community member is dominant between moderate to high and informal settlements, the level of physically helping a community member is dominant between very low to low. The mean of formal settlements is higher than the informal settlements, with chi-square 0.000 implicating a significant difference among both settlements.

This difference may be attributed to the factor that most of the construction in the informal settlements is a ‘katcha’ form of construction, and in case of a disaster, it completely obliterates, making it impossible for the neighbors to help or rescue someone physically.

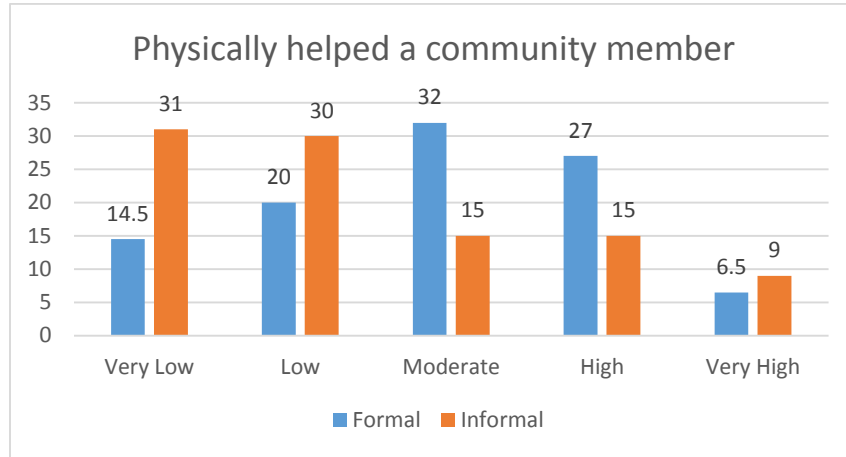


Figure 65 Physically helped a community member

7.14 Helped a community member with skills

Social capital can be summed up by the amount of significance given to social ties and connections (Putnam, 2000). This indicator has been used to gauge the strength of social capital in a community through the assistance provided to one community member by another by their skills.

Helped with skills			
	Formal	Informal	Chi-Square
	Percentages		
Very Low	9	7.5	X ² =24.03 Sig=0.000
Low	19.5	13.5	
Moderate	35.5	23	
High	29.5	35	
Very High	6.5	21	
Mean	0.61	0.69	
Standard Deviation	0.21	0.24	

Table 54 Helping through skills

The table above shows that the formal settlements have 35% of the respondents with a moderate level of helping with skills and 29.5% with a high level of helping with skills. On the contrary, informal settlements have 23% of the respondents with a moderate level of helping with skills and

35% with a high level of helping with skills. The mean of informal settlements is higher than the formal settlements, with chi-square 0.000 indicating a significant difference.

This can be attributed to the fact that most respondents in the informal settlements are either domestic workers or laborers whereas the formal settlements respondents have white-collar jobs. Therefore, informal settlements have a slightly greater number of people that help others out with their skills.

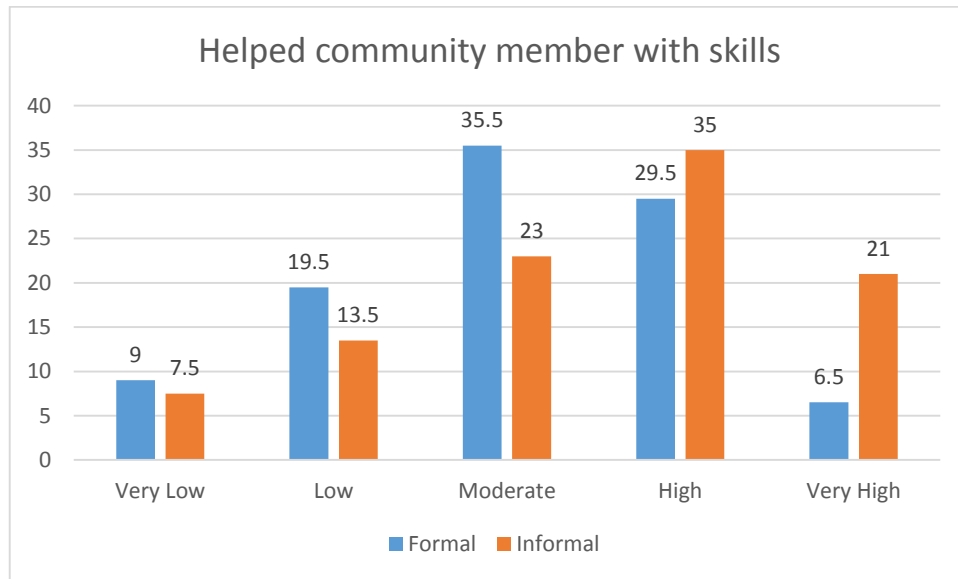


Figure 66 Helped with skills

7.15 Summary

The average participation in CBOs in the informal settlements lies at a moderate level, but it is still greater than the formal settlements. In both settlements, the participation in disaster projects lies prevalently between low to moderate levels. When the respondents were asked about the functional disaster projects in their community, only a few people hinted at preparedness workshops, and those were in the formal settlements. The mean values of 0.52 and 0.43 suggest greater interaction with a politician or official in the formal settlements than the informal settlements. The participation of the respondents in formal settlements is greater as there are local officials who the people hold accountable. The mean values 0.8 and 0.62 depict that the respondents of the formal settlements are more responsible and have contributed to the social capital of their community by their collective action through casting their vote.

Chapter 8

Consolidated and Knowledge Resources among Formal Informal Settlements

8.1 Consolidated and Knowledge Resources

The consolidated resources are based on shared or common assets or resources that provide the community with improved understanding and familiarity with the community needs for gaining mutual benefits. The knowledge resources are the common or shared individual and collective knowledge of community, values, actions and reputations, collective interests and volunteering, etc.(Falk & Harrison, 2000).

8.2 Donation to Emergency Recovery Funds

This indicator has been used to determine the frequency of donations to emergency recovery funds for disasters in the communities. The respondents were asked if they had ever donated to emergency recovery funds or not.

Donated to emergency recovery funds			
	Formal	Informal	Chi-square
	Percentages		
Never	16.5	13.5	X ² =10.27 Sig=0.036
Rarely	15	22.5	
Sometimes	20.5	33.5	
Often	22	20.5	
Always	26	10	
Mean	0.61	0.59	
Standard Deviation	0.24	0.24	

Table 55 Donation to emergency recovery funds

The table above states that in formal settlements, 22% of the respondents have often donated to the emergency recovery funds, and 26% of the respondents have always donated to the emergency recovery funds, whereas in the informal settlements, 22.5% of the respondents have rarely donated to the emergency recovery funds, 33.5% have sometimes donated, and 20.5% have often donated

to the emergency recovery funds. The mean values of 0.61 and 0.59 with a chi-square value of 0.036 (less than 0.05) indicate significant differences among both types of settlements.

Although the inclination in the formal settlements to donate to the emergency recovery funds is moderate yet it is greater than the informal settlements because here, the local governing bodies are more involved and accountable, and they do participate in restoration work compared to the informal settlements. Another noteworthy cause is the difference in the income brackets of both types of settlements. Since the residents of the formal settlements earn more than informal settlements, they are more willing to donate to the emergency recovery funds. Moreover, the perceived risk of disaster is greater among the residents of formal settlements. Therefore, it adds to their inclination to donate for an emergency or crisis.

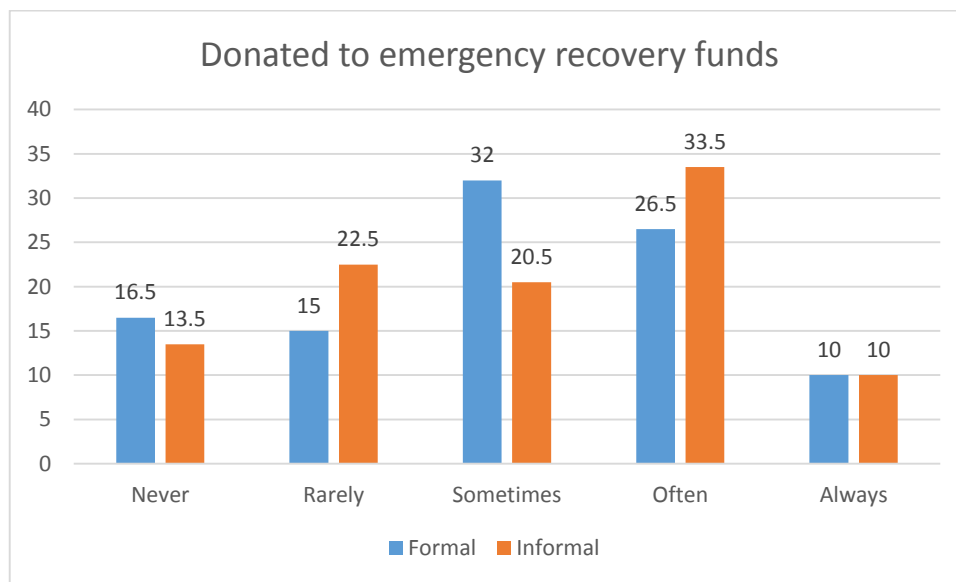


Figure 67 Donated to emergency recovery funds

8.3 Emergency Training Drills/Programs

This indicator has been used to measure the participation of the respondents in emergency training drills. The respondents were asked about their level of participation in training programs.

Participation in emergency training drills			
	Formal	Informal	Chi-square
	Percentages		
Very Low	12	44	X ² =58.23 Sig=0.000
Low	29	23.5	
Moderate	42	17.5	
High	13	11	
Very High	4	4	
Mean	0.53	0.41	
Standard Deviation	0.19	0.23	

Table 56 Participation in drills

The table above shows that 29% of the respondents have rarely participated in emergency training drills in the formal settlements, and 42% of the respondents have sometimes participated in emergency training drills. In contrast, 44% of the respondents have never participated in the training drills in the informal settlements, and 23.5% of the respondents have rarely participated in the training drills. The mean values 0.53 and 0.41 with a chi-square value of 0.000 indicate a significant difference among both types of settlements.

According to the data collected through interviews, there have been only a few emergency training programs carried out in the informal settlement via some non-governmental organizations, while in the formal settlements, the residents are more educated in comparison to the informal settlements and these drills are more frequent as they are often carried out at schools, colleges, or workplaces. Therefore, the average of participation in these training programs or drills is greater in the formal settlements.

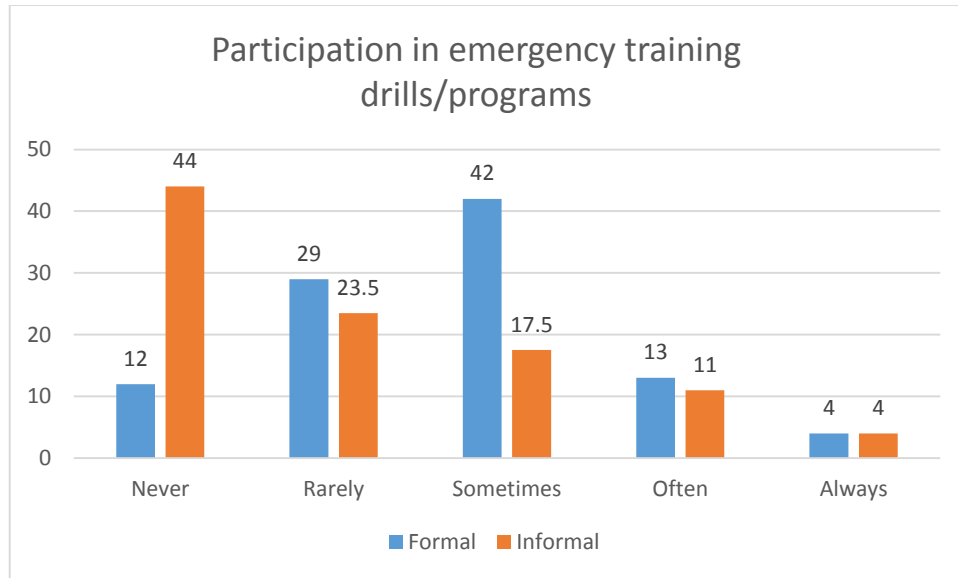


Figure 68 Participation in training drills

8.4 Participation in Disaster Awareness Programs

This indicator has been used to measure the participation of the respondents in disaster awareness programs. The respondents were asked about their level of participation in awareness programs.

Participation in disaster awareness programs			
	Formal	Informal	Chi-square
	Percentages		
Very Low	13	30	X ² =20.39 Sig=0.000
Low	33.5	27	
Moderate	35.5	23	
High	13	14.5	
Very High	5	5.5	
Mean	0.52	0.47	
Standard Deviation	0.2	0.24	

Table 57 Participation in disaster awareness programs

The table above shows that 33.5% of the respondents have rarely participated in disaster awareness programs in the formal settlements, and 35.5% of the respondents have sometimes participated in disaster awareness programs. In contrast, 30% of the respondents have never participated in these programs in the informal settlements, and 27% of the respondents have rarely participated, while

23% have sometimes participated. The mean values 0.52 and 0.47 with chi-square value 0.000 indicate significant differences among both types of settlements.

The participation in disaster awareness programs is greater in formal settlements because these programs are often carried out at workplaces or schools. The level of education in the formal settlements is greater, so they are more aware of the fact that disaster awareness is a need of the hour. Therefore, they are more inclined to invest in it. The risk perception of disaster is greater among the residents of formal settlements, while the residents of the informal settlements deem it unnecessary to be part of such programs because of their negligence to the disaster risk.

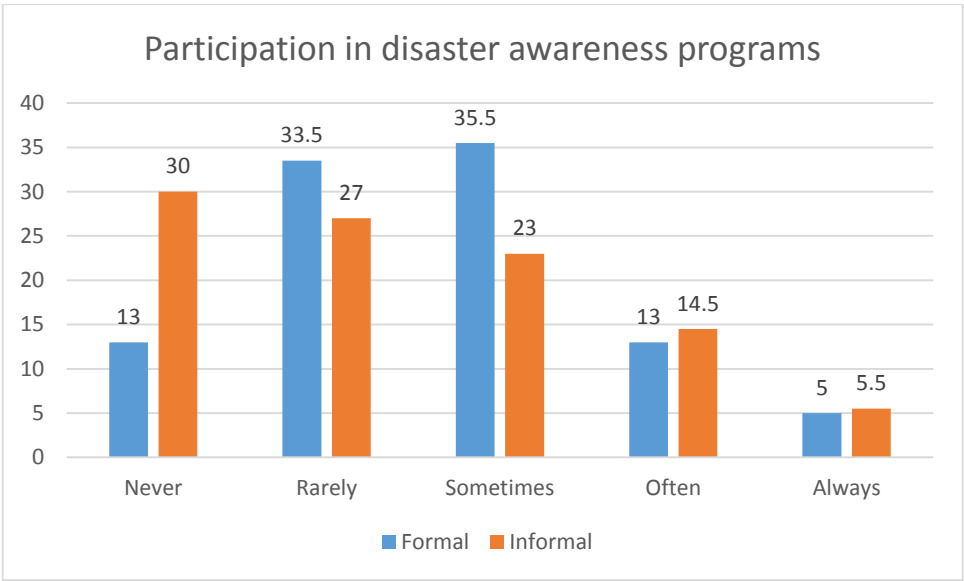


Figure 69 Participation in disaster awareness programs

8.5 Effectiveness of Early Warning Systems

This indicator has been used to measure the effectiveness of early warning systems for disasters. The respondents were asked how effective they think the early warning systems in their community are.

Effectiveness of early warning systems			
	Formal	Informal	Chi-square
	Percentages		
Very Low	14.5	30	X ² =14.12 Sig=0.007
Low	30.5	25	
Moderate	35.5	23	
High	12.5	13	
Very High	7	9	
Mean	0.56	0.52	
Standard Deviation	0.23	0.26	

Table 58 Effectiveness of early warning systems

The table above shows that in the formal settlements, 30.5% of the respondents believe that the effectiveness of the warning systems is low, and 35.5% of the respondents believe that the effectiveness of the warning systems is moderate, whereas, in the informal settlements, 30% of the respondents believe that the effectiveness of the warning systems is very low, 25% believe it is low and 23% believe that it is moderate. The mean values 0.56 and 0.54, with a chi-square value of 0.007, indicate significant differences among both types of settlements.

The average difference in the effectiveness of early warning systems of both types of settlements lies between low-to-moderate levels. Still, the effectiveness is higher in formal settlements because the residents are more educated and aware of the disaster risk. Hence, they look out for information, and they have increased access to various forms of warning systems other than television or radio, e.g., social media, smartphones, pamphlets, newspapers, etc.

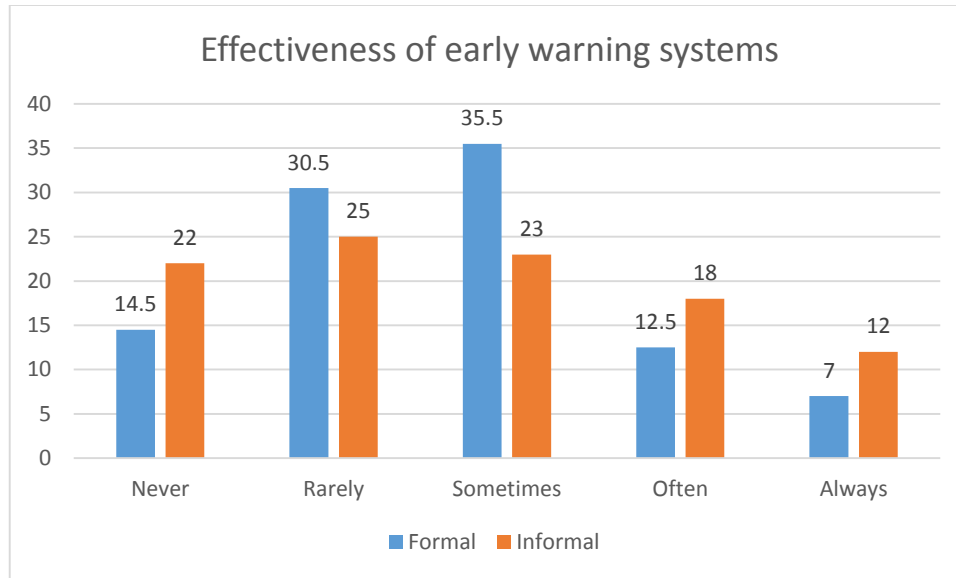


Figure 70 Effectiveness of early warning system

8.6 Sources of Information Dissemination

This indicator has been used to measure the number of sources mostly employed for information dissemination for a disaster. The respondents were provided with 7 different sources (TV, radio, internet, social media, banners/pamphlets, newspaper) and were asked to choose as many as possible. In the table below, ≤ 1 indicates at least one source employed, and $2+$ indicates two or more sources.

Sources of information dissemination			
	Formal	Informal	Chi-Square
	Percentages		
≤ 1	11.5	81	X ² =65.73 Sig=0.000
> 2	88.5	19	
Mean	0.88	0.23	
Standard Deviation	0.69	0.078	

Table 59 Sources of information dissemination

The table above shows that in the formal settlements, 88.5% of the respondents use more than two sources to acquire information about disasters while 11.5% use at least one source to acquire information about disasters, whereas, in the informal settlements, 81% of the respondents use one or less than one source to acquire information about disasters and 19% use more than two sources

to acquire information about disasters. The chi-square value shows a significant difference among both types of settlements.

The people in the informal settlements prevalently use two mediums for information acquiring regarding the disaster, i.e., television and radio, whereas, in the formal settlements, people use newspapers, social media, smartphones, pamphlets, and banners as well. This is caused by two factors. First, most of the people in the informal settlements are either uneducated or have merely done matriculation. Secondly, people have low-income, so they can barely afford a television, let alone a smartphone. The lack of education and access to the internet keep them limited to one or two sources to acquire information regarding a disaster.

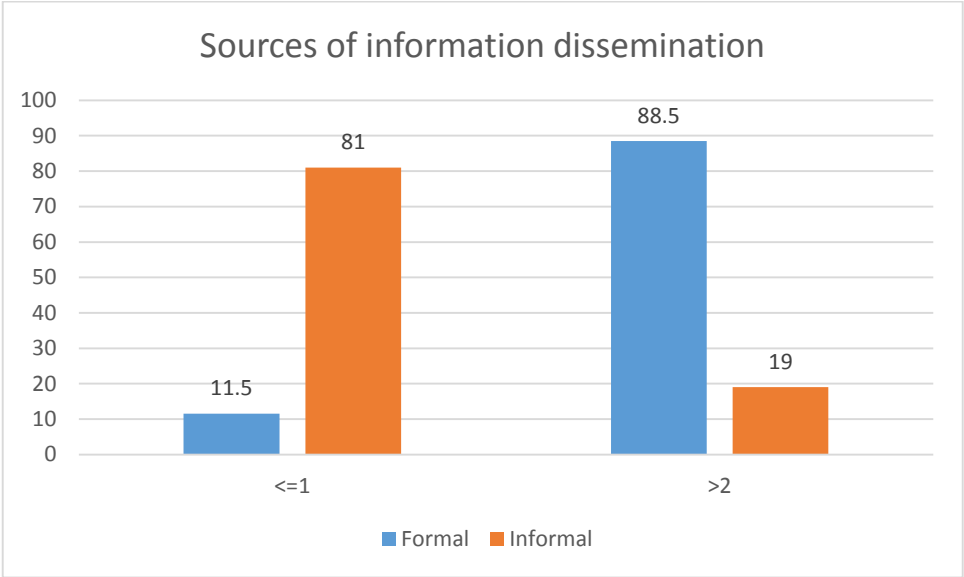


Figure 71 Sources of information dissemination

8.7 Personal Support Groups

This indicator has been used to determine the presence of personal support groups related to the disaster in the community where people help each other in recovering from trauma.

Personal support group for mental health post-disaster			
	Formal	Informal	Chi-square
	Percentages		
Never	12	57	X ² =96.23 Sig=0.000
Rarely	30.5	21.5	
Sometimes	37.5	11.5	
Often	15	6.5	
Always	5.5	3.5	
Mean	0.54	0.35	
Standard Deviation	0.21	0.22	

Table 60 Participation in personal support groups

The table above shows that 30.5% of the respondents in the formal settlements have rarely been a part of support groups, and 37.5% have sometimes participated in support groups related to the disaster. In the informal settlements, 57% of the respondents have never participated in personal groups, and 21.5% have rarely participated. The mean values 0.54 and 0.35, with chi-square value 0.000, show significant differences among both types of settlements.

The participation in personal support groups for mental health after a disaster is greater in the formal settlements because the education level is higher, people are more aware of the adverse effects of a disaster on mental health, and they have more resources and access to these types of groups as compared to the informal settlements.

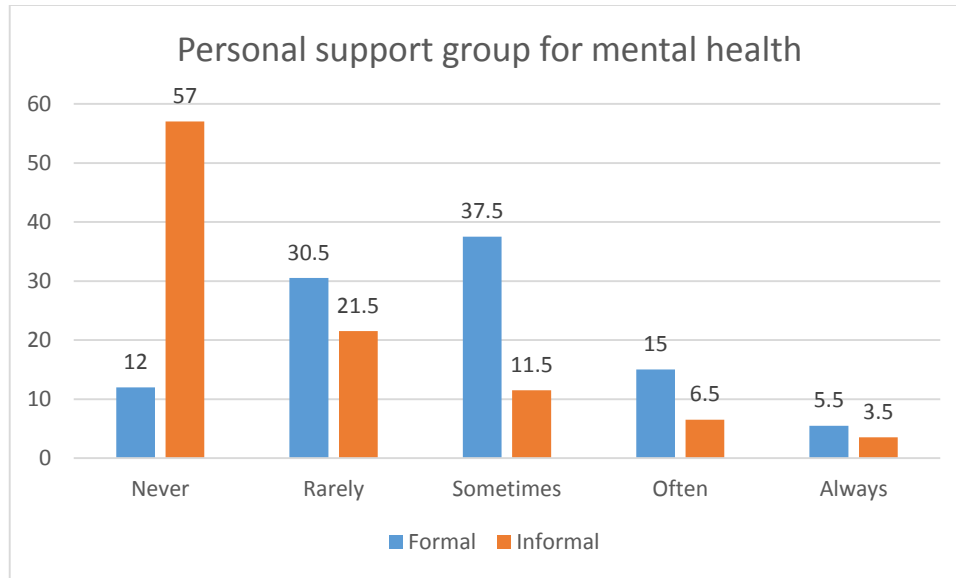


Figure 72 Participation in personal support groups

8.8 Emergency Evacuation Shelter

This indicator has been used to determine whether a community has an emergency evacuation shelter or not.

Evacuation center/ emergency shelter			
	Formal	Informal	Chi-square
	Percentages		
No	29	76.5	X ² =1.56 Sig=0.211
Yes	71	23.5	
Mean	0.71	0.23	
Standard Deviation	0.55	0.42	

Table 61 Emergency evacuation shelter

In the formal settlements, 71% of the respondents responded 'yes' to the presence of an emergency shelter, while 76.5% of the respondents responded 'no'. As the formal settlements are planned neighborhoods, therefore, they have a designated emergency shelter, while the informal settlements are unplanned and mostly squatter settlements; therefore, they lack an emergency shelter or evacuation center.

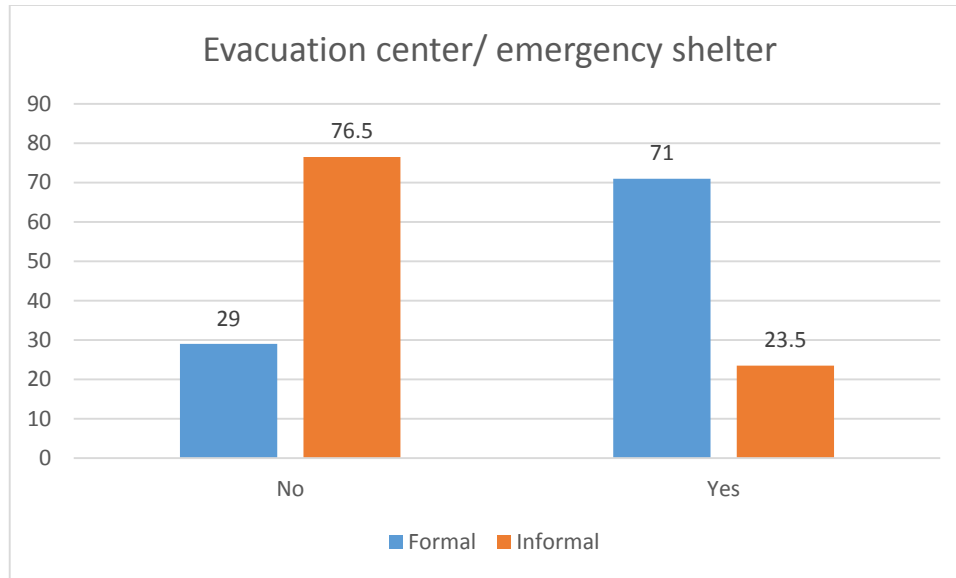


Figure 73 Evacuation centre/emergency shelter

8.9 Evacuation Route/Plan

This indicator has been used to determine whether a community has an evacuation route or plan in case of a disaster or not.

Evacuation route/plan			
	Formal	Informal	Chi-square
	Percentages		
No	80	88.5	X ² =26.72 Sig=0.000
Yes	20	11.5	
Mean	0.20	0.11	
Standard Deviation	0.41	0.31	

Table 62 Evacuation route plan

The table above shows that the majority of the respondents (80% and 88.5%) in both types of settlements said 'no' to the presence of an evacuation route or plan in case of a disaster, while only meager (20% and 11.5%) number of respondents said 'yes' to the presence of an evacuation route or plan. This indicates that both formal and informal settlements do not have an evacuation route or plan.

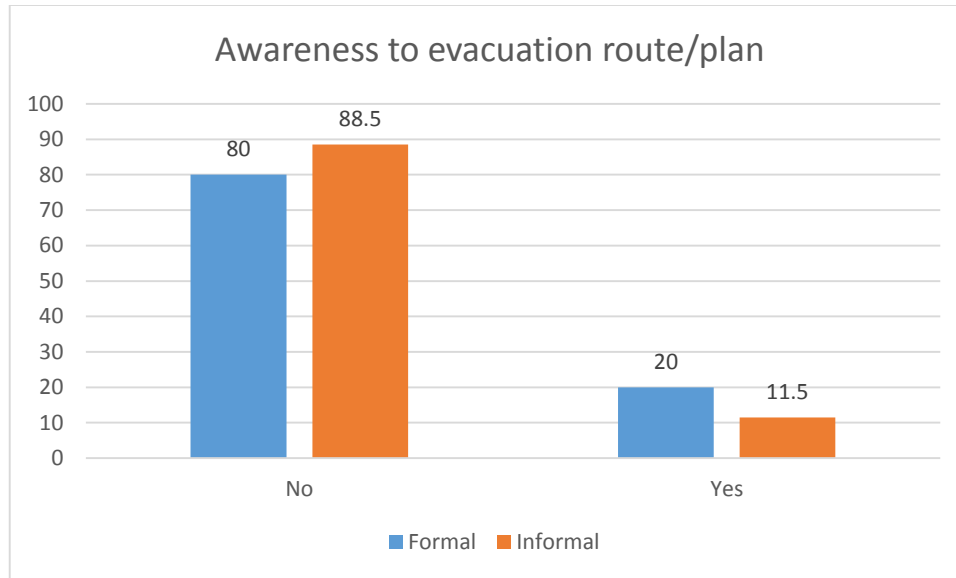


Figure 74 Awareness to evacuation route/plan

8.10 Summary

The inclination in the formal settlements to donate to the emergency recovery funds is moderate, yet it is greater than the informal settlements because here, the local governing bodies are more involved and accountable, and they do participate in restoration work as compared to the informal settlements. The average of participation in disaster training programs or drills is greater in the formal settlements. Participation in disaster awareness programs is greater in formal settlements because these programs are often carried out at workplaces or schools. The level of education in the formal settlements is greater, so they are more cognizant of the fact that disaster awareness is a need of the hour. Therefore, they are more inclined to invest in it. As the formal settlements are planned neighborhoods, therefore, they have a designated emergency shelter, while the informal settlements are unplanned and mostly squatter settlements; therefore, they lack an emergency shelter or evacuation center.

Chapter 9

Social Capital between Formal and Informal Settlements

This section consists of quantification the individual dimension of predefined dimensions of social capital under the influence of disasters between formal and informal settlements. The formal settlements consist of two areas from Islamabad and Rawalpindi: sectors I-9/I-10 and Satellite Town. The informal settlements consist of squatter settlements slums of Islamabad and Rawalpindi: Eisa Nagri and Dhoke Ratta. The main purpose of this analysis is to determine how social capital in disasters varies in formal and informal areas as both have different social dynamics and social fabric. Moreover, to quantify the defined dimensions of social capital separately and measure the overall social capital.

9.1 Civic and Political Participation

The table below shows the comparison of civic and political participation between formal and informal settlements.

Civic & Political Participation	Mean	Standard Deviation	Independent t-Test
Formal	0.56	0.13	t= -4.42
Informal	0.57	0.15	Sig=0.659

Table 63 Civic and political participation

Post-quantification analysis of civic and political participation among both settlements of the two cities resulted in insignificant variation. The mean values of the formal and the informal settlements are 0.56 and 0.57. This indicates that the overall participation is of a moderate level. The cause of this has been identified through the survey data. It implicates that most of the components of civic and political participation are either non-functional or non-existent. There have only been a handful of NGOs contributing to disaster recovery, while the few civic organizations present are either associated with the local mosque or church. If there has been a crisis, the mosque or the church collects charity from the locals, or the people themselves donate to them. There have been only a few disaster projects that were functional in their community, only a few people hinted at preparedness workshops, and those were in the formal settlements.

They were either carried out as an exercise at their workplace or schools, whereas relief and relief distribution were carried out in both settlements. The respondents in the formal settlements have open access to the local official in their areas. They can call on him/her for a joint session with the community members. In contrast, the informal settlements have little or no interaction with an official since the majority of the area of their settlements are encroached areas, whereas providing help to the fellow community member in any form (physical, financial, skills, etc.) is prevalent in the informal settlements.

9.2 Network Ties and Trust

The table below shows the comparison of network ties and trust between formal and informal settlements.

Network Ties and Trust	Mean	Standard Deviation	Independent t-Test
Formal	0.57	0.12	t= -5.834
Informal	0.65	0.16	Sig=0.000

Table 64 Network ties and trust

In the table above, the mean values of network ties and trust in formal and informal settlements are 0.57 and 0.65, respectively. The chi-square value is 0.036 (less than 0.05) indicates a significant difference in network ties and trust between both settlements. Moreover, the value of the independent t-test 0.000 is also less than 0.05, further indicating a significant difference among the means of both settlements. The network ties and trust in informal settlements are stronger as compared to formal settlements.

Although formal settlements have more public spaces, yet they have less daily interaction. This leads to weak social ties in the community. While in the informal settlements, the elderlies prefer to sit outside their homes in the street, and children play outside more often. This increases the day-to-day interaction of the residents and leads to stronger social ties. Therefore, informal settlements have more community support than formal settlements. In addition, the residents of the informal settlements are more informed and concerned about their neighbors' health and conditions. This factor contributes to the strengthening of the social structure of their neighborhood. Therefore, in informal settlements in crisis or disaster situations, more people can count on their neighbors to help them out of their distress. Therefore, it can be concluded that the

structure of social cohesion is stronger in informal settlements. As social capital is defined as resources embedded in the social connection (Lin N. , 2001) therefore, it can be concluded that the informal settlements have a greater potential of resources during a disaster due to their strong social network.

9.3 Consolidated and Knowledge Resources

The table below shows the comparison of consolidated and knowledge resources between formal and informal settlements.

Consolidated & Knowledge Resources	Mean	Standard Deviation	Independent t-Test
Formal	0.47	0.17	t= 5.387
Informal	0.38	0.15	Sig=0.000

Table 65 Consolidated and knowledge resources

In the table above, the mean values of consolidated and knowledge resources in formal and informal settlements are 0.47 and 0.38, respectively. The chi-square value is 0.002 (less than 0.05) indicates a significant difference in consolidated and knowledge resources between both settlements. Moreover, the value of the independent t-test 0.000 is also less than 0.05, further indicating a significant difference among the means of both settlements. The consolidated and knowledge resources in formal settlements are more enhanced as compared to informal settlements.

This is caused by the exclusion of these resources in the informal settlements because most of the components of these resources, such as emergency recovery funds, training drills, awareness programs, etc., are inaccessible in the informal settlements. Moreover, the majority of the components of these resources require education and awareness, both of which are lacking in the informal settlements.

9.4 Social Capital in Formal and Informal Settlements

The table below shows the comparison of social capital between formal and informal settlements.

Social Capital	Mean	Standard Deviation	Independent t-Test
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Formal	0.53	0.11	t= -4.44
Informal	0.58	0.13	Sig=0.000

Table 66 Social capital in formal and informal settlements

In the table above, the mean values of the social capital in formal and informal settlements are 0.53 and 0.58, respectively. The value of the independent t-test 0.000 is less than 0.05, indicating a significant difference among the means of both settlements.

The comparison of overall social capital shows that informal settlements have greater social capital in case of a disaster than formal settlements. This implies that if properly functional, the social capital in the informal settlements can assist in disaster recovery. On the other hand, the formal settlements recover swiftly than the informal settlements. This is since the physical infrastructure of the formal settlements is more enhanced.

9.5 Comparison between Perceived and Actual Social Capital

This section compares the quantified social capital and the perception of social capital people have to find whether they are positively or negatively correlated.

Correlation			
		My community supports the culture of social capital	Social Capital
My community supports the culture of social capital	Pearson Correlation	1	.599
	Significance		.000
	N	400	400
Social Capital	Pearson Correlation	.599	1
	Significance	.000	
	N	400	400

Table 67 Actual and perceived social correlation

The table above indicates that the actual/quantified social capital and the perceived social capital are positively correlated. It indicates that as the actual social capital increase, people's perception of it will also increase.

9.6 Summary

This section consisted of quantification the individual dimension of predefined dimensions of social capital under the influence of disasters between formal and informal settlements. Post-quantification analysis of civic and political participation among both settlements of the two cities resulted in insignificant variation. The mean values of the formal and the informal settlements are 0.56 and 0.57. This indicates that the overall participation is of a moderate level. The network ties and trust in informal settlements are stronger as compared to formal settlements. The consolidated and knowledge resources in formal settlements are more enhanced as compared to informal settlements. This is caused by the exclusion of these resources in the informal settlements because the majority of the components of these resources, such as emergency recovery funds, training drills, awareness programs, etc., are inaccessible in the informal settlements. The comparison of overall social capital shows that informal settlements have greater social capital in case of a disaster than formal settlements. This implies that if properly functional, the social capital in the informal settlements can assist in disaster recovery

CHAPTER 10

Conclusions and Recommendations

10.1 Summary of the findings

- The common practice of mitigating the disaster comprises enhancing the community resilience by investing in the physical infrastructure. The social infrastructure is often a derelict aspect in disaster risk reduction policies. Community resilience is influenced by its social connections. In case of an impending disaster, these connections can be utilized to access several resources such as monetary aid, physical assistance, informational resources, and emotional support (Aldrich & Meyer, 2015).
- The study areas, Islamabad and Rawalpindi, are susceptible to disasters such as earthquakes and frequent flooding. The respondents belonging to the informal settlements (Eisa Nagri and Dhoke Ratta) of both cities have similar socioeconomic characteristics, and the formal settlements (I-9/I-10 and Satellite Town) have comparable characteristics. The respondents of the informal settlements belong to the low-income group, and the formal settlements' respondents belong to the middle-income group. More than fifty percent of the respondents in the informal settlements either uneducated or educated up to matric level. As the informal settlements are slums, therefore, they have a more 'katcha' form of construction. Most of the respondents of informal settlements have experienced a disaster as compared to the formal settlements due to the physical attributes of the neighborhood they live in. The prevalent form of disaster among all areas is flooding.
- Post-quantification analysis of civic and political participation among both settlements of the two cities resulted in insignificant variation. This indicates that the overall participation in civic and political organizations is of a moderate level. The cause of this has been identified through the survey data. It implicates that most of the components of civic and political participation are either non-functional or non-existent. There have only been a handful of NGOs that have contributed to disaster recovery, while the few civic organizations present are either associated with the local mosque or church. If there has

been a crisis, the mosque or the church collects charity from the locals, or the people themselves donate to them.

- The strength of social ties is measured through the dimension of network ties and trust. The results show that informal settlements have stronger social ties as compared to formal settlements. It can be implicated that the informal settlements are more socially cohesive. Although most informal settlements are low-income households, they have more frequency of financially helping their community members during a disaster. They have a higher value of trust in family and neighbors. The community support is greater in the informal settlements also. The perception of social capital has a higher percentage in informal settlements. The support of CBOs/NGOs and institutions is deficient, and the trust in these bodies is also low.
- Post-quantification analysis of consolidated and knowledge resources among both settlements of the two cities resulted in significant variation. The consolidated and knowledge resources in the formal settlements are more enhanced in the formal settlements than the informal settlements. This is caused by the exclusion of these resources in the informal settlements because most of the components of these resources, such as emergency recovery funds, training drills, awareness programs, etc., are inaccessible in the informal settlements. Moreover, the majority of the components of these resources require education and awareness, both of which are lacking in the informal settlements. One of the main sources of disaster information in the informal settlements is the television, as most of the people do not have access to the internet or smartphones and cannot read well due to the lack of education, so the newspaper becomes inoperable. In addition, the formal settlements have an emergency evacuation center in both areas, while the informal settlements do not have any and awareness of the evacuation route or plan in case of a disaster.
- The comparison of overall social capital shows that informal settlements have greater social capital in case of a disaster than formal settlements. This implies that if properly functional, the social capital in the informal settlements can assist in disaster recovery. On the other hand, the formal settlements recover swiftly than the informal settlements. This is since the physical infrastructure of the formal settlements is more enhanced. Moreover, the significant difference between actual and perceived satisfaction was also observed, which

implies as the perception of social capital in disasters among people increases, the actual social capital also increases.

10.2 Recommendations

The following potential recommendations were forwarded, based on the study findings:

Having known the significance of social capital during disasters, decision-makers, town planners, disaster managers, and community members should prioritize enhancing recovery and mitigation policies and strategies that revolve around social infrastructure before the disaster occurs. For instance, local community members will keep themselves updated with the contact information of their neighbors and will be made aware of any emergency needs or medical conditions.

To increase the social capital among the formal settlements, artificial methods should be implemented. One of the successful strategies is focus group meetings (Nancy E. Brune, 2009). The focus groups will be held by the local community members, where they will meet regularly for numerous months to discuss their mutual concerns regarding their community.

To enhance trust in institutions or voluntary associations (NGOs, CBOs etc.), the concept of time banking and community currency should be implemented where the community members will be rewarded for making donations to the cause or volunteering in community organizations. This will create an incentive for the people to invest their time and money through the circulation of rewards within the community (Lietaer, 2004).

To enhance the social capital on the whole, a number of strategies should be utilized to increase collective responsibility and identification of the community (Dynes, 2002). To make the people disaster responsible, several civic and religious organizations should be enlisted to convey regular messages regarding individual's civic and moral responsibility, particularly reminding the people of the greater need to self-mobilize in case of an imminent disaster. Occasions like disaster anniversaries and memorials can be a source of such opportunities.

Civic organizations should be incorporated in the planning process through collecting knowledge and creating an inventory of the resources available in the community, both materials and people. These organizations should be encouraged to contribute to disaster campaigns. The campaigns will carry out

awareness programs in the informal settlements to increase the risk perception of disaster among the community or conduct training drills for emergency evacuation regularly in schools, colleges, or workplaces in both formal and informal settlements.

All the stakeholders should be involved in the decision-making process by making more people a part of the decision-making. A forum should be created where the officials can directly interact with the decision-makers to enhance the disaster risk reduction or restoration process. Moreover, helping self-initiated acts should be encouraged instead of viewing them as a disruption from the planned action. There should be a lens shift that views self-initiated actions as a supplement to the planned action (Dynes, 2002).

The local government should form support for the management of emergency activities through institutionalization to keep the interest intact of politicians or community members to disaster risks.

Evaluation of existing social capital in context of implementation of initiatives to strengthen development and health programs in low-income and middle-income communities.

Redefining policy measures to enhance social capital in recovery and reconstruction, the inclusion of vulnerability factors in decision analysis, and policy evaluation at various stages pertaining to disaster. Policymakers to monitor gaps in execution.

10.3 Limitations

The limitation of this study is that data was only collected from households, and other types such as business places, workplaces, schools, etc., were excluded. This study's key focus was natural disasters. Manmade disasters were not incorporated. This study only represents the population of the regional level and not the national level. This study was conducted in urban areas. It may have a possibility of information biasness as there has not been a recent disaster and people vaguely recalled their pattern of socialization within the community during the disaster.

10.4 Future recommendations

In Pakistan, understanding the pattern of socialization and gathering accurate disaster data is challenging. This study focused on civic participation, social ties, and knowledge resources to quantify social capital among households during disasters. Further studies can be conducted that

incorporate workplaces and schools etc., for sampling. The future studies may also be rural in nature. It is recommended for future studies to quantify the structural dimension of social capital: bonding, bridging, and linking as well as the cognitive dimension (norms, reciprocity, trust, etc.). In addition, further research can be conducted to study the influence of social capital on health and resilience with specific disasters and magnitudes to measure preparedness and recovery in a community.

This study provides us with a distinctive perception of social patterns after a disaster. The study reflects on the cultural characteristics of Pakistan. However, this is an index-based study, and the indicators of social capital used in the study can be utilized as a baseline to compare other cultures regarding social capital.

10.5 Conclusion

The study carried out intends to quantify social capital in disaster-prone areas of formal and informal settlements. The study has been conducted in the formal and informal settlements of the city of Islamabad and Rawalpindi. The sample size 400 was calculated through Slovin's formula. Each settlement was assigned a sample of 100 respondents. Data was collected through a questionnaire survey. The indicators are identified through existing research and divided into four components: socio-economic characteristics, civic and political participation, network ties and trust, and consolidated and knowledge resources. Three out of four components have been quantified to measure social capital in disasters. Descriptive statistics, chi-square, and independent t-test have been used for analysis. A comparison of each component has been made between both settlements, and lastly, the overall social capital of both settlements is calculated. This is an index-based study. The quantification of dimensions of social capital shows that civic and political participation is the same in both formal and informal settlements. Informal settlements have stronger social ties and networks and more trust in the community to help them in crisis, while formal settlements have more consolidated and knowledge resources. The overall social capital is greater in the informal settlements as well the correlation between actual and perceived social capital is also positive.

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APPENDIX

Questionnaire

Questionnaire Sr. No: _____

Date: _____

Area: _____



The purpose of this study is to examine “*Quantifying Social Capital in Hazard Prone Areas*”. This study is being conducted at National University of Science and Technology (NUST) Islamabad. The survey should only take 4-5 minutes to complete. Be assure that all answers you provide will be kept in the strictest confidentiality.

1. Age: _____
2. Household Income: _____
3. Education: _____
4. Gender: *Male* *Female*
5. Household size: _____
6. Number of elderly (60+ yrs.) in the household: _____
7. Number of adolescents (12-16): _____
8. Number of children: _____
9. Number of women: _____
10. People earning in household: Males _____ Females _____
11. Employment type: _____
12. How long have you been living in your community? _____
13. Number of educated members in the house: *Uneducated* *Up-to Matric* *College* *University*

14. Type of Dwelling	<i>Owned</i>	<i>Rented</i>	15. Construction Type	<i>Pakka</i>	<i>Katcha</i>	
16. Type of residence	<i>Shared</i>	<i>Independent</i>	17. Family system	<i>Joint</i>	<i>Nuclear</i>	
18	Do you have a job/business in your community's vicinity?				<i>Yes</i>	<i>No</i>
19	Have you experienced a disaster in this neighborhood?	<i>Yes</i>	<i>No</i>	If yes, Specify:		
20	The rate of crime in my neighborhood is	<i>Very High</i>	<i>High</i>	<i>Moderate</i>	<i>Low</i>	<i>Very Low</i>
21	My mobility is affected by the crime rate in my neighborhood.	<i>Strongly Agree</i>	<i>Agree</i>	<i>Undecided</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
22	What is your level of participation in Community Based Organizations related to disaster?	<i>Very High</i>	<i>High</i>	<i>Moderate</i>	<i>Low</i>	<i>Very Low</i>

23	What is your level of participation in Non-Governmental Organizations (NGOs) related to disaster?	<i>Very High</i>	<i>High</i>	<i>Moderate</i>	<i>Low</i>	<i>Very Low</i>
24	What is your level of participation in a community project related to disaster (provision of sandbags, planting riverside grass/trees, damage repair, etc.)?	<i>Very High</i>	<i>High</i>	<i>Moderate</i>	<i>Low</i>	<i>Very Low</i>
25	What is your level of interaction with a politician or official on crisis/disaster-related issues?	<i>Very High</i>	<i>High</i>	<i>Moderate</i>	<i>Low</i>	<i>Very Low</i>
26	If yes, what was the mode of Interaction?	<i>In-person</i>	<i>Social Media</i>	Other:		
27	What is your level of participation in events regarding the decision-making process?	<i>Very High</i>	<i>High</i>	<i>Moderate</i>	<i>Low</i>	<i>Very Low</i>
28	How frequently have you been provided a loan by Community Based Organizations or NGOs in crisis?	<i>Always</i>	<i>Often</i>	<i>Sometimes</i>	<i>Rarely</i>	<i>Never</i>
29	How frequently have you funded for damage repair of a public/community place after a disaster?	<i>Always</i>	<i>Often</i>	<i>Sometimes</i>	<i>Rarely</i>	<i>Never</i>
30	How often have you helped your community member in crisis in form of goods or material things?	<i>Always</i>	<i>Often</i>	<i>Sometimes</i>	<i>Rarely</i>	<i>Never</i>
31	How often have you provided shelter to people in crisis?	<i>Always</i>	<i>Often</i>	<i>Sometimes</i>	<i>Rarely</i>	<i>Never</i>
32	How often have you financially helped your community member in crisis?	<i>Always</i>	<i>Often</i>	<i>Sometimes</i>	<i>Rarely</i>	<i>Never</i>
33	If yes, what was the approximate amount?					
34	How often have you physically helped your community member in crisis?	<i>Always</i>	<i>Often</i>	<i>Sometimes</i>	<i>Rarely</i>	<i>Never</i>
35	If yes, specify.					
36	How often have you helped your community member in crisis with my skills?	<i>Always</i>	<i>Often</i>	<i>Sometimes</i>	<i>Rarely</i>	<i>Never</i>
37	Did you vote in the last election?	<i>Yes</i>		<i>No</i>		

38	The number of eligible voters in the house.	Enter number:				
39	How often has your family supported you during/after a disaster/crisis?	<i>Always</i>	<i>Often</i>	<i>Sometimes</i>	<i>Rarely</i>	<i>Never</i>
40	How often has your neighbor has supported you during/after a disaster/crisis?	<i>Always</i>	<i>Often</i>	<i>Sometimes</i>	<i>Rarely</i>	<i>Never</i>
41	How often has your Community supported you during/after a disaster/crisis?	<i>Always</i>	<i>Often</i>	<i>Sometimes</i>	<i>Rarely</i>	<i>Never</i>
42	I have been provided financial aid during/after a disaster by the following:	<i>Always</i>	<i>Often</i>	<i>Sometimes</i>	<i>Rarely</i>	<i>Never</i>
I	Neighbor					
II	CBOs/NGOs					
III	Public Institutions/Govt.					
IV	Politicians					
43	I have sought help while stressed from my network/community.	<i>Always</i>	<i>Often</i>	<i>Sometimes</i>	<i>Rarely</i>	<i>Never</i>
44	I have entertained visitors in my household.	<i>Always</i>	<i>Often</i>	<i>Sometimes</i>	<i>Rarely</i>	<i>Never</i>
45	I have visited the sick or housebound in my neighborhood.	<i>Always</i>	<i>Often</i>	<i>Sometimes</i>	<i>Rarely</i>	<i>Never</i>
46	I have exchanged gifts/cards with my neighbor/community member.	<i>Always</i>	<i>Often</i>	<i>Sometimes</i>	<i>Rarely</i>	<i>Never</i>
47	I have responded to a neighbor's/community member's query.	<i>Always</i>	<i>Often</i>	<i>Sometimes</i>	<i>Rarely</i>	<i>Never</i>
48	My family members have good relations with the neighbors/community members.	<i>Definitely</i>	<i>Probably</i>	<i>Possibly</i>	<i>Probably Not</i>	<i>Definitely Not</i>
49	My community supports the culture of social capital.	<i>Definitely</i>	<i>Probably</i>	<i>Possibly</i>	<i>Probably Not</i>	<i>Definitely Not</i>
50	My level of trust among the following to help me out in crisis/disaster.	<i>Very High</i>	<i>High</i>	<i>Moderate</i>	<i>Low</i>	<i>Very Low</i>
I	Family					
ii	Neighbor					

iii	Institutions					
iv	NGOs/CBOs/politician					
51	How frequently have you donated to the emergency recovery funds?	<i>Always</i>	<i>Often</i>	<i>Sometimes</i>	<i>Rarely</i>	<i>Never</i>
52	How frequently have you been a part of personal support groups for mental health post-disaster?	<i>Always</i>	<i>Often</i>	<i>Sometimes</i>	<i>Rarely</i>	<i>Never</i>
53	What is your level of participation in emergency/crisis training drills/programs?	<i>Very High</i>	<i>High</i>	<i>Moderate</i>	<i>Low</i>	<i>Very Low</i>
54	What is your level of participation in participated in disaster awareness programs?	<i>Very High</i>	<i>High</i>	<i>Moderate</i>	<i>Low</i>	<i>Very Low</i>
55	How much do you think the early warning systems in your community are effective?	<i>Very High</i>	<i>High</i>	<i>Moderate</i>	<i>Low</i>	<i>Very Low</i>
56	My neighborhood/community has an evacuation center/emergency shelter.	<i>Yes</i>			<i>No</i>	
57	People in my community are made aware of the evacuation route/plan in case of a disaster.	<i>Yes</i>			<i>No</i>	
58	What are the main sources of information dissemination regarding a disaster in your community? (choose as many)	<i>TV</i>	<i>Radio</i>	<i>Internet</i>	<i>Smart phone</i>	<i>Newspaper</i>
		<i>Pamphlets</i>				<i>Banners</i>

Suggestions & Comments:
