AN ASSESSMENT OF DISASTER RISK MANAGEMENT IN URBAN INFORMAL SETTLEMENTS AND ITS EFFECTIVENESS ON THE URBAN POOR

CASE STUDY: MUKURU KWA NJENGA

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UNITED STATES INTERNATIONAL UNIVERSITY – AFRICA (USIU – A)

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STUDENT DECLARATION

I, the undersigned, declare that this is my original work and has not been presented to any other college, institution or university other than the United States International University – Africa for academic credit. Where appropriate within the thesis I have made full acknowledgement to the work and ideas of others or have made reference to work carried out in collaboration with other persons.

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This thesis has been presented for examination with my approval as the appointed supervisor at the university.

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ABSTRACT

Informal settlements, where mostly the urban poor reside, tend to be located in hotspots of natural hazards such as floods, fire, and even earthquakes. The devastating impacts of these natural hazards on such settlements can be attributed to the higher levels of physical, economic, social and environmental vulnerability in conjunction with inadequate and poor level of disaster preparedness. Conceptualizing a detailed risk profile, in the context of informal settlement characteristics presents a starting point to which the impacts posed by environmental hazards can be addressed effectively. The policy environment such as land use planning impacting the informal settlement characteristics i.e. demographic, financial, social, and locational is key to managing disaster risks in informal settlements and can assist in disaster preparedness.
CHAPTER ONE: INTRODUCTION

1.0 BACKGROUND

Disaster risk is defined as the potential loss of life, injury, or destroyed or damaged assets which could occur to a system, society or a community in a specific period of time, determined probabilistically as a function of hazard, exposure, and capacity. In the technical sense, it is defined through the combination of three terms: hazard, exposure and vulnerability. Disaster Risk Management is the application of disaster risk reduction policies and strategies, to prevent new disaster risks, reduce existing disaster risks, and manage residual risks, contributing to the strengthening of resilience and reduction of losses. Disaster risk management actions can be categorized into; prospective disaster risk management, corrective disaster risk management and compensatory disaster/residual risk management (Baas, Ramasamy, DePryck, & Battista, 2008).

Urban informal settlements is defined as dense, unplanned and impoverished make-shift shelters, dwellings or residential structures built from diverse material such as metal sheets, wood, mud, cardboard etc., which do not comply with approved building regulations and are informally located on land that is not proclaimed. These settlements, usually defined by certain criteria such as self-build housing, sub-standard services, and residents’ low incomes, are often characterized as problematic due to associations with poverty, high crime, degradation of the local ecosystem, irregularity, marginalization, and see social and health problems (Huchzermeyer & Karam, 2006).

The growth of informal settlements, slums and poor residential neighborhoods is a global phenomenon accompanying the growth of urban populations. An estimated 25% of the world’s urban population live in informal settlements, with 213 million informal settlement residents
added to the global population since 1990 (UN-Habitat, 2013). Informal settlements are residential areas where (UN-Habitat, 2015; Brown, 2015): inhabitants often have no security of tenure for the land or dwellings they inhabit – for example, they may squat or rent informally; neighborhoods usually lack basic services and city infrastructure; housing may not comply with planning and building regulations, and is often situated in geographically and environmentally sensitive areas.

A number of interrelated factors have driven the emergence of informal settlements: population growth; rural-urban migration; lack of affordable housing; weak governance particularly in policy, planning and urban management; economic vulnerability and low-paid work; marginalization; and displacement caused by conflict, natural disasters and climate change (UN-Habitat, 2015).

Many urban informal settlements are risky places (Adelekan et al., 2015; Bull-Kamanga et al., 2003). Dense concentrations of people and economic activities, high levels of water and air pollution, and inadequate provision of basic services and risk-reducing infrastructure result in high levels of physical injury, serious illness, reduced productivity and loss of life (Hardoy et al., 2001; McGranahan et al., 2001). Most such risk whether from disasters (Douglas et al., 2008) or from disease (Ezeh et al., 2017) disproportionately impacts low-income groups.

Towns and cities are growing rapidly although the overall rate of growth of nations’ urban populations has been slowing in recent years, meaning that an ever-larger number of people live in urban contexts. Smaller urban centers with fewer than 1 million inhabitants are among the fastest growing, although research has overwhelmingly focused on the largest cities (Satterthwaite, 2016). This expansion in urban populations is not matched by an equivalent
expansion in resources, capacity and appropriately located, properly serviced and affordable land and housing for low-income groups. This means that many urban residents live and are likely to continue living in what can be termed as slums and urban informal settlements. UN Habitat (2013) suggests that this is the case for 61.7% of the urban population in Africa. In addition, this urban growth is taking place alongside climate change and other pressing global challenges, such as the threat of new and emerging diseases. The rapid growth of highly vulnerable urban communities living in informal settlements, many of which are on land at high risk from extreme weather. Taken together, this means that low-income urban residents are forced to contend with multiple, sometimes overlapping, risk environments (Revi et al., 2014).

Mukuru Kwa Njenga is one of the largest slums in the East of Nairobi. It is located in Embakasi Constituency, but also extends into Makadara and Starehe constituencies. Mukuru Kwa Njenga is part of the larger cluster of Mukuru informal settlements situated about 8 km to the southeastern side of Nairobi’s central business district, along the industrial area. Mukuru Kwa Njenga settlement is strategically located, within 20-30 minute drive from the city center of Nairobi. Its proximity to the city and to the industrial area gives it numerous advantages. The slum is surrounded by three major roads: Mombasa Road on the Southern side, Outering Road on the North Eastern side and Airport North Road on the South Eastern side. The settlement spreads over two sub locations, namely Imara Daima Sub-location to the West and Mukuru Kwa Njenga Sub-location to the East (Gichuki, 2015).

Mukuru Kwa Njenga is primarily an informal settlement. The name Mukuru Slum is coined from the Kikuyu word ‘Mukuru’ meaning place of depression or dumping site. The genesis of this urban informal settlement dates back to 1958. Part of the place was an old quarry where most stones that built the factories were excavated. Huge holes the sizes of manmade dams were
exposed which later became death traps to children and laborers working in the neighboring factories, and a breeding ground for mosquitoes during the rainy seasons. The City Council condemned the land as unfit for any permanent construction and converted it to a dumping site for garbage from the city. When the holes were filled with garbage, poor people who were scavenging in the dumpsite started building houses made of wood, cartons and iron sheets. Poverty led to many joining them and a slum finally came to existence named ‘Mukuru’ or garbage site.

In the 80’s most of the land around Mukuru was given by government to private developers. Majority of land was not developed, and people migrating from their rural homes looking for job opportunities in the city and an affordable place to stay were informally settled in the private land along the years, near their places of work. The local administration later came in through the chiefs, who were in charge of allocating people plots at a fee in hand with the chairmen of the area. As the slum grew, the area became harder to control. To solve this problem different villages were created in 2002 as a way of providing security, pointing leaders in each village in order to have control over the affairs in the area. From then, the area was sub divided into eight villages (zones): Sisal, Milimani, Vietnam, Riara, Moto Moto, Wape Wape, Zone 48 and MCC. Sisal was the first area built up in 1984, followed by Milimani, Vietnam and the North part of Zone 48 in the next ten years (Gichuki, 2015).

Most of the inhabitants in Mukuru Kwa Njenga are immigrants from rural areas looking for job opportunities. These areas, built up as demand for shelter increased, are characterized by high urban congestion, an organic and unplanned urban layout but also by a more organized population. The other four villages started from a need of expansion of the congested villages from 1998 to 2000. They were planned by the community and are characterized by a more
organized urban layout. The other four villages started from a need of expansion of the congested villages from 1998 to 2000. They were planned by the community and are characterized by a more organized urban layout (IEBC, 2011).

The critical factors that caused the formation of Mukuru Kwa Njenga informal settlements are notably related to several major interrelated changes: poverty; rapid industrialization and urbanization and influx of people into urban areas; war, natural disasters leading to massive movement of people to places of opportunity and safety; ineffective housing policies; inefficient public administration, inappropriate planning and inadequate land administration tools. Manifestations of informality are attributed to the lack of effective planning, effective land management system and zoning regulations for urban development. Slum dwellers in Mukuru Kwa Njenga live in hazardous and unhealthy conditions and in portions of land which they can’t claim ownership yet they have occupied them for over 3 decades.

Mukuru Kwa Njenga informal settlements are mainly characterized by informal land tenure, inadequate access to basic services, both social and physical infrastructure and housing finance (Vienna, 2004). Other characteristics include lack of secure tenure, housing that contradicts city by-laws, housing built on land not owned by the housing owner, lack or inadequate access to basic public services, substandard housing and inadequate building structures, illegal subdivision of buildings, poverty, criminality and social exclusion, and unhealthy living conditions and hazardous locations. Mukuru Kwa Njenga inhabitants are characterized as having insecure residential status, inadequate access to safe water, inadequate access to sanitation and other basic infrastructure and services, poor housing quality, and overcrowding. Therefore, Mukuru Kwa Njenga is an urban informal settlement that necessitates disaster risk management for its residents who belong in the urban poor cluster (Gichuki, 2015).
In 2018, President Uhuru Kenyatta chaired a cabinet meeting during which cabinet considered and approved the national disaster risk management policy. The policy is benchmarked on the best practices in disaster risk management. It lays down the strategies for ensuring the Government commits itself to enhancement of research in disasters and formulation of risk reduction strategies.

In the recent past, there has been a steady increase of disasters in the Kenyan urban informal settlements areas especially in Nairobi. These urban disasters are distinct in many ways and the intensity of damage is usually very high, warranting effective disaster management plans e.g. the Mukuru Kwa Njenga fire that claimed over 100 lives. Of late, there has been an alarming increase in such types of disasters such as fires, collapsing buildings, terrorist bombings and motor accidents. Search and rescue efforts in the urban areas also require specialized training. Action plans for checking unplanned urbanization and ensuring safer human habitat against all forms of disasters are recognized as priority areas.

The Kenya Red Cross Society’s response to the September 2011 oil pipeline explosion in the Mukuru Sinai Lunga Lunga informal settlement in Nairobi was recognized in the preparedness category for its efforts in disaster risk reduction. The blast claimed 121 lives and left 137 families homeless. Staff and volunteers set up tents for registration, re-united missing family members and provided vital psychosocial support for those who survived. To prevent a similar crisis from occurring in the future, the Kenya Red Cross Society implemented an urban disaster reduction risk programme in seven informal settlements in Nairobi. Red Cross volunteers and staff visit settlements and children’s clubs, explaining the various hazards that exist, and work with residents to find ways of mitigating those risks. Disaster risk reduction is a major part of the
Kenya Red Cross Society’s community resilience strategy, which includes food security and livelihood approaches, environmental management and restoration initiatives.

1.1 PROBLEM STATEMENT

The statement of the research problem is identified from the gaps which scholars in the fields of disaster risk management and urban informal settlements have failed to address.

Informal settlements in urban areas around the world are usually faced with a number of environmental hazards. This is largely attributed to high poverty, lack of social infrastructures as informal settlements tend to exist outside the formal provisions budgets of many urban authorities and due to the very high population densities characterizing these areas. Some of the environmental hazards in the urban informal settlements include pollution, fire, electric faults, floods, demolitions, sanitation challenges, disease outbreaks, pest infestations among others. The lack of essential disaster risk management initiatives results to people in informal settlements being highly exposed to many hazards. Within the informal settlements are vulnerable people such as women, children and the disabled who usually exposed to the hazards and they greatly suffer from the disasters. Mukuru Kwa Njenga is an urban informal settlement that faces factors such as uncontrolled urbanization on vacant land that is unsuitable for safe housing, overcrowding, encroachments and environmental degradation. It has also been subjected to various disaster risks including rapid spread of fires, floods, demolitions, disease outbreaks such as cholera and pest infestations such as bedbugs. This study addresses the issue of disaster risk management initiatives in urban informal settlements with Mukuru Kwa Njenga slum in Nairobi as the case study. This study assesses whether disaster risk management initiatives are there, how effective they are, and if they are actually in place, what are their hindrances and challenges they
face in achieving their goal because disasters still keep occurring upon the urban poor in Mukuru Kwa Njenga rendering them to have vulnerability to the hazards and disasters. This study therefore seeks to identify why this is so and endeavors to bridge the gap in literature that is nonexistent on this problem.
1.2 OBJECTIVES OF THE STUDY

• To investigate the disaster risks in urban informal settlements and their effects on the urban poor at a slum in Nairobi.

• To examine the vulnerabilities of slum residents to disasters risks.

• To assess the effectiveness of disaster risk management initiatives among the urban poor at Mukuru Kwa Njenga.

1.3 RESEARCH QUESTIONS

• What are the disaster risks in urban informal settlements and what effects do they have on the urban poor at a Nairobi slum?

• What are the vulnerabilities of slum residents to disasters risks?

• What are the disaster risk management initiatives among the urban poor at Mukuru Kwa Njenga?

1.4 SIGNIFICANCE/JUSTIFICATION OF THE STUDY

This study documents and analyzes disaster risk management in the urban informal settlements in Nairobi’s Mukuru Kwa Njenga, an area not adequately covered by the existing body of literature. It provides data and information necessary for the design of interventions that would capitalize on the information that is not well established from in-depth scholarly studies. The study further investigates whether or not disaster risk management has any effectiveness on the urban poor where there is no sufficient studies. Most of the informal settlements in Nairobi are congested, lack social amenities, are overcrowded and have poor infrastructural facilities,
including being vulnerable to environmental hazards and disasters. The significance of this study is to fill the existent gap in literature and to assess disaster risk management and its effectiveness on the urban poor in the urban informal settlements in Nairobi using Mukuru Kwa Njenga slum as a case study.

This study would be helpful in providing insight as to how disaster risk management can be effective in urban informal settlements. According to the latter research findings of the study, the proliferation of informal settlements in urban areas leads to urban poverty as well as natural and man-made risks. Therefore, the study will provide new literature that will facilitate the Kenyan national and county governments to recognize the risks that residents face in urban informal settlements and adopt policies and integrated actions to create sustainable, inclusive and prosperous settlements within Nairobi and other urban areas. Furthermore, this study will provide a wealth of knowledge on recommendations to propose on how to improve the lives of the urban poor in Mukuru Kwa Njenga.

1.5 SCOPE OF THE STUDY

This study is limited to Mukuru Kwa Njenga slum as the case study.

1.6 DEFINITION OF TERMS

Hazard - A dangerous condition or event that threatens or has the potential for causing injury to life or damage to property or the environment.

Disaster - A serious disruption of the functioning of a society, causing widespread human, material, or environmental losses which exceed the ability of the affected society to cope using its own resources.
Risk - The probability that a particular system or population will be affected by hazards.

Vulnerability - Potential for loss due to a sudden or gradual environmental interruption.
CHAPTER TWO: LITERATURE REVIEW

2.0 INTRODUCTION

Informal settlements are dwelling places of around a billion people in the world. In other words, one-seventh of the world’s population and one-third of the world’s urban population live in slums respectively (UN Habitat, 2013). The population transformation projections based on the current rate of world’s urban population growth suggest that an estimated 66 percent of the population will live in urban areas by 2050 from 54 percent in 2014 (United Nations, 2014). Literature suggests that urban population growth rate occurs primarily in small and medium sized cities (West & Orr, 2007) where informal settlement expansion occurs in hazard prone areas such as flood plains, valley, marshy areas and watercourses. High population density coupled with deprived locations of informal settlements as a result of urban growth compounds existing vulnerability (Satterthwaite, 2011).

Risk is seen as a function of disaster hazard, vulnerability and exposure (Kron, 2002). Vulnerability is defined as the susceptibility of a system to disaster hazards due to its inherent characteristics. Exposure refers to degree and extent to which a system is wide-open to disaster hazards. The level of vulnerability in informal settlements has made it imperative to assess, analyze and present its risk profile to facilitate effective hazard risk management. Risk assessment, mitigation, and evaluation are the three major embodiments of hazard risk management (Usamah, Handmer, Mitchell & Ahmed, 2014). Risk assessments provide a strong basis to commence the process of reducing the negative consequences posed by natural hazards and involves hazard identification and associated risk impacts.
The negative effects posed by hazards require prioritization, implementation, and maintenance of appropriate hazard risk-reducing measures recommended from the risk assessment process. The recommended actions to mitigate the risk from assessment are then evaluated to ascertain its effectiveness after implementation. However, hazard risk management in informal settlement has received little attention in literature potentially due to its problematic nature (Zahari & Ariffin, 2013) and also, these settlements are located outside the planning schemes of urban areas. Moreover, the informal settlements are exposed to high levels of vulnerability with limited coping capacity. Against this backdrop, this paper constructs a framework, through a literature review, coupling the concepts of disaster hazards, vulnerability and informal settlements to develop better understand disaster risk management in informal settlements.

2.1 THEORETICAL FRAMEWORK

2.1.1 Constructivism

From a constructivist perspective, disaster risk is both ontologically and epistemologically subjective. Evidence from the UNISDR Global Assessment Reports supports the assertion that exposure and vulnerability to physical hazards are socially constructed through the interaction of economic, cultural and political processes operating at several different scales (Lavell & Maskrey, 2013). Disasters are thus defined as a social phenomenon, such that disaster is socially constructed and rooted in the social structure of the community affected by a natural hazard (Quarantelli, 2005). Constructivism views disaster risk as socially produced through the formation of a common, and shared definition (Lovekamp & Arlikatti, 2013). According to Lavell et al. (2012, p. 36), constructivism reflects an emerging understanding that disaster risk and disaster, while potentiated by an objective, physical condition, are fundamentally a social
construction, the result of social choice, social constraints, and societal action and inaction. Such a move towards the social dimensions reflects a shift in understanding disaster risk from an act of nature to the intersection of society and nature, and avoidable human constructions. Social constructivism acknowledges that disaster risk in general is not generated by hazards that impinge on societies and communities alone, but rather it is the product of social structure and dominant institutional practices. This perspective suggests that exploring disaster risk is contingent on how the notions of risk come to be constructed, identified and dealt with in particular historical, socio-cultural and political contexts (Shefali, 2009).

Constructivism has been adopted in the sociological risk literature and among civil society activist groups across parts of the developing world, who emphasize relative contexts as being central to understanding risk (Shefali, 2009). Constructivism denaturalizes disaster risk. By denaturalizing natural disasters, Demeritt (2002) referring to O’Keefe et al. (1976), argues that constructivism makes two fundamental claims: first, without people there is no disaster; and second, what makes a disaster disastrous is not natural in the sense of extreme physical events. These two claims are rooted in the concept of vulnerability and exposure to disaster risk. According to O’Keefe et al. (1976), disaster risk marks the interface between an extreme physical phenomenon and a vulnerable human population.

UNISDR (2004, p. 16) defines vulnerability as the condition determined by physical, social, economic, and environmental factors or processes, which increase the susceptibility of a community to loss from hazard impacts. Lowe et al. (2007) also highlighted the importance of the human element in disaster risk as they argued that, the vulnerability approach is people centered and it concentrates on the social, political and cultural factors of people that make them more vulnerable to loss from a natural hazard. Wisner et al. (2004, p. 11) sees vulnerability as
the characteristics of a person or a group and their situation that influence their capacity to anticipate, cope with, resist and recover from the impact of natural hazard.

In explaining the manner in which vulnerable conditions are created, Blaikie et al. (1994) propose two inter-related models the Pressure and Release Model (PAR) and the Access Model (AM). The PAR explains the progression of vulnerability, from unsafe conditions through economic and social dynamic pressures to the root causes from specific relations of exploitation, discrimination within the political economy (Wisner et al., 2004). The AM explains how the different components such as household budget, income opportunities, class relations and structures of domination change in different ways over time after the disaster (Wisner et al., 2004). This view of vulnerability links disaster risk with the development theory because the marginalization process shapes who in society are vulnerable to risk and whether risk turns into disaster (Pelling, 2003). According to Alexander (2000), in vulnerability, people not physical forces are the principal cause of risks and disasters. Extreme geological and climactic events lead to disasters in the human context in which they occur (Demeritt, 2002). Managing disaster risk thus focuses on reducing vulnerability (Alexander, 2000). According to Demeritt (2002), human beings have the power to reduce, or even eliminate, the toll from natural disasters.

2.1.2 Harris-Todaro Model

The study of migration, in general, and rural-urban migration, in particular, has for long been an important area of research in development economics. The Harris-Todaro framework (Todaro, 1969; Harris and Todaro, 1976) has become a cornerstone of models of rural-urban migration. The aim of the Harris-Todaro framework is to explain the persistent rural-urban migration in developing countries despite the high unemployment rates in cities. The main idea is quite
simple since it says that migration will occur as long as the urban expected income (i.e. income times the probability of finding an urban job) is higher than the rural one.

An important issue in this literature is the study of the policy implications of these models. In particular, one of the conclusions of the Harris-Todaro model is that creating urban jobs is an insufficient solution to the urban unemployment problem because of the induced negative effect on rural migration, which may outweigh the positive effect of creating jobs (Todaro, 1976). This is referred to as the Todaro paradox. Because rural risk-neutral agents consider expected wages when deciding to migrate to the city, inter-labor market i.e. rural-urban equilibrium mandates urban unemployment. This unemployment ensures that the expected urban wage is equal to the rural wage. Contrary to what one would expect, the migration response to several policies aimed at reducing urban unemployment is to raise rather to reduce urban unemployment.

It has long been realized that in order for an economy to develop or grow, a large amount of labor has to be transferred from the traditional agricultural sector in rural areas, where the productivity of labor is low, negligible, zero, or even negative, to the modern manufacturing sector where the productivity of labor is higher and rising due to capital accumulation in that sector.

Decreasing unemployment benefits has a direct negative effect on urban wages and thus more urban jobs are created. This is the attraction force to the city. There is also a direct negative effect on rural-urban migration because the expected utility of new migrants is reduced due to the fact that they need to spend some time unemployed before finding an urban job. There is also an indirect effect on urban wages since, when there are more jobs in the city, urban firms can reduce their efficiency wage because unemployment acts as a worker’s discipline device.
Because the two repulsion forces are strong enough, the net effect is such that creating urban jobs via a reduction in unemployment benefit increases urban employment while reducing urban unemployment (Todaro, 1976).

Concerning the employment subsidy policy, there is only a positive direct effect on job creation i.e. labor demand, since it becomes cheaper to employ urban workers. However, this policy also triggers rural-urban migration since the expected wages and thus the expected utility of migrants increase. As a result, the perverse effect of this policy is that it can increase both urban employment and unemployment. When taxes on profits are introduced in the model, these effects are mitigated and the impact on urban unemployment depends on the level of taxes compared to that of the subsidy (Todaro, 1976).

An important aspect of urban unemployment in developing countries is that it is predominantly open. The massive influx of rural migrants in the cities has been instrumental in fostering an overwhelmingly faster population growth in urban areas than in the rural ones. Rural workers are lured to migrate by economic incentives as well as by other attractions of an urbane life. While some of the migrants do manage to secure jobs in industries, the less-fortunate ones get absorbed only in the urban informal sector and the rest wait for their chance to get employment and thus swell the number of open urban unemployment. A substantial portion of the urban population in a country is engaged in the informal sector (Chaudhuri, 2010).

2.2 INFORMAL SETTLEMENTS: RISK HAZARD VULNERABILITY PERSPECTIVE

Informal settlements, slums, squatter settlements, unplanned towns and shantytowns are terms that are used interchangeably in literature. Conversely, the definition of the term informal settlement is arguable and subject to much academic debate (Nguluma, 2003).
Informal settlements are places built outside land-use scheme and without planning permission. They are composed mainly of makeshift houses that deviate from the standard building regulations. More so, areas marked as informal settlement have inadequate access to safe water and sanitation facilities, irregular supply of electricity and road for emergency access. Similarly, they are an overcrowded population and an insecure tenure of stay (Ziervogel, Waddell, Smit & Taylor, 2016).

Over the world, the location of informal settlement on hazard risk areas has been discussed extensively in literature (Napier, 2007). In this paper, vulnerability of informal settlements to natural hazard is categorized into four areas namely: physical, economic, environmental and social vulnerabilities. The location of informal settlements i.e. flood plains, marshy areas, low-lying areas and river courses coupled with high population growth, poor planning and quality of housing (King & Amponsah, 2012) and unpredictable strike of natural hazard renders them vulnerable to natural hazards. Dwellers of informal settlements, mostly in-migrant, have low economic capabilities that seriously impact upon their ability to prepare adequately for an impending natural hazard. A high percentage of in-migrants are low-income earners or unemployed rendering them incapable of renting a house or room in a properly laid out residential area. Their economic position pushes them to rent apartments in informal locations, as they have cheaper residential opportunities. In addition, the low-income characteristics of such people inhibit their ability to invest in structural mitigation measures to reduce hazard impacts. People with disabilities, women and children are the most vulnerable within informal settlements in the occurrence of disasters (Durst, 2015).

Expansion in terms of population and industry in informal settlements triggers an increase demand for natural resources such as land for both residential and industrial
development reasons. This in turns results in natural vegetation destruction in these areas to accommodate the rising construction activities, which increases settlers’ susceptibility to different types of natural hazards. Changes in land-use patterns are another phenomenon that arises in the course of urban population increase. The predominant changes usually occur in agricultural land-use to residential or industrial land-use (UNISDR Drought Risk Reduction Framework, 2009). Features of urban construction such as paving of surfaces reduce infiltration, and permeability of run-off water through the soil.

Inequality among humans, countries and communities give rise to social vulnerability, which shape, the susceptibility of various groups to natural hazards. The vast differences in susceptibility levels result in differences in preparation and resilience rate. Informal settlement are characterized by low access to political power, poor levels of education together with culturally and linguistically diverse minority groups. Low level of literacy in informal communities hinders their capability to decipher warning information and access to preparatory and recovery information. The diverse culture and ethnic structure of informal settlements may make communication of risk an arduous task as risk message needs to be communicated in several languages to pave way for effective communication response (Cutter, Boruff, & Shirley, 2003).

2.3 VULNERABILITY

Reducing vulnerability is a direct way and proactive approach of mitigating disaster impacts. Vulnerability to disaster hazards is context specific, which requires stringent assessment and analysis of characteristics of a given area to reduce disaster consequences. Characteristics of informal settlements have strong linkages with vulnerability to disaster hazards (Tas, Durak &
Informal settlements are heterogeneous in nature and mainly made up of immigrants from different background and culture. People with disabilities, women and children equally form a great vulnerability cluster within informal settlements in case of impending disasters. People who reside in informal settlements are generally with no or little educational qualification to work in the formal sector of the economy (Maarman, 2009). Majority of the inhabitants are engaged in low-income related activities such as production of handicraft products, small-scale commercial activities e.g. sale of grocery and agriculture. Inhabitants have limited source of income and unstable livelihood making them incapable of re-building their houses let alone bouncing back to normal business operation when struck by a disaster hazard (Alexander, 2005).

Most informal settlements before major growth were left as vacant areas of urban environment due to their inherent risk to various forms of disaster hazards (Doberstein, 2009). The demarcation of such areas explains why informal settlements are associated with poor zoning and planning, inadequate infrastructure, poor environmental conditions and insecure tenure. Frequent threat of eviction of informal settlers by city authorities (Williams, 2012) and low-income levels reinforces settlers’ behavior of constructing housing of low quality. Dwellers residing in these settlements perceive that spending huge sums of money building houses is not rational as they may be demolished during eviction. Moreover, the insecure tenure characteristics induce the construction of low quality housing less resistant to disaster hazards (Vargas-Hernandez, Noruzi, & Irani, 2011).

Urban authorities have side-lined planning in informal settlements based on the perception that they are problematic and lie outside the planning area. As a result, informal settlements are characterized by inadequate access to infrastructure such as storm drains. Inadequate access to
storm drains and lack of maintenance of the available storm drains coupled with poor waste management reduces ability of run-off water to move swiftly. Similarly, behaviors of dwellers to use available storm drains as refuse areas (Pelling, 2003) exacerbate their vulnerability and impacts of environmental hazards.

High percentage of urban population growth occurs in informal settlements (West & Orr, 2007). The immediate consequence of high growth in population is degradation of land for residential and industrial construction purposes. Paving of land surfaces during construction is indispensable, which reduces infiltration and increases run-off water channeled through the limited drains in informal settlements. This increases the susceptibility of informal settlement to flooding as well as increased devastating impacts. Social resilience to disaster depends highly on the strong social cohesion between community members and authorities (Maguire & Hagan, 2007).

2.4 RISK HAZARDS AND URBAN POOR VULNERABILITY

The importance of assessing urban vulnerability to natural hazards, emphasizing the necessity for increased resilience to achieve sustainable development, has been highlighted by several national and international organizations. Natural hazards are defined as natural processes or phenomena that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation. The likelihood and extent of adverse effects are determined by vulnerability, produced through susceptibility and ability to cope. Alternatively phrased, the likelihood and extent of these effects are a function of exposure, sensitivity and adaptive capacity. In the urban context, the determination of vulnerability to natural hazards considers how climate change may alter the exposure and sensitivity of urban populations, with a
particular emphasis on social, economic, political and environmental issues with which climate change combines to produce risk. It is therefore critical not only to identify disturbances that urban areas may experience, and to increase urban resilience through appropriate disaster risk management and landscape and urban planning, but also to develop an understanding of the main interacting components determining social and biophysical vulnerability in urban areas.

The growing demographic characteristics of developing countries have increased and continue to increase disaster vulnerability and exposure particularly in informal settlements. The merging together of towns and cities as a result of urban population expansion connote widespread levels of vulnerabilities and exposure within and between neighboring areas. Moreover, the projected hike in the frequency of natural hazards strike and interactions with increased disaster vulnerability levels and degree of exposure impedes the achievement of sustainable development. Literature suggests that nothing can be done to prevent the emission of disaster hazards but vulnerability and extent of hazard exposure can be eradicated or reduced drastically to decrease disaster impacts. With this underlying fact, the importance of policies cannot be overlooked if disaster risks are to be reduced significantly (UN-Habitat, 2015).

2.5 FACTORS CONTRIBUTING TO THE DEVELOPMENT OF URBAN INFORMAL SETTLEMENTS

Many governments refuse to acknowledge the existence of informal settlements, which undermines city-wide sustainable development and prosperity. These settlements continue to be geographically, economically, socially and politically disengaged from wider urban systems and excluded from urban opportunities and decision-making (UN-Habitat, 2015). City government attitudes to informal settlements range from opposition and eviction to reluctant tolerance and
support for legalization and upgrading. Upgrading informal settlements, through tenure regularization and provision of infrastructure, is widely accepted as preferable to relocation (Devas et al., 2004), helping to sustain social and economic networks considered vital for livelihoods.

Living in informal settlements disproportionately affects certain groups. Informal settlements often sit on the periphery of urban areas, lacking access to markets and/or resources. For women, for example, this can heighten barriers they face in accessing livelihood opportunities. Home-based workers also face challenges to entrepreneurial activity (Chant, 2014). Women in informal settlements spend more time and energy accessing basic services than other urban counterparts, limiting their ability and time to earn through paid employment (UNFPA, 2007). In addition, the prevalence of male-biased land tenure policies and restrictions on women’s rights to own property decreases the likelihood of alternative housing options. Poor quality housing, or eviction and homelessness, can also increase the risk of insecurity and sexual violence (Chant, 2013; McIlwaine, 2013).

Rapid urbanization and climate change together increase the vulnerability of poor urban communities to natural hazards, undermining urban resilience. With urbanization has come growth of the urban poor and informal settlements, also referred to as slums. A whopping 32% of the world’s urban population lives in slums. Informal settlements are densely populated and lack basic property rights and access to critical infrastructure, such as clean water and sanitation. They are also often most at risk in the event of environmental hazards. To protect their livelihoods, health, and safety, residents of informal settlements are the most in need of secure property rights and inclusion in land management and planning, while also the most vulnerable to eviction without notice or compensation (Chant, 2013; McIlwaine, 2013).
2.6 CAUSES OF DISASTERS IN URBAN INFORMAL SETTLEMENTS

The rapid growth of cities places pressure on the government and civil society organizations to provide adequate and affordable shelter and services for the urban poor, especially new migrants. Insecure employment and unemployment, poverty, the lack of alternate housing opportunities, social and economic exclusion, and the need to be located close to urban resources and opportunities, result in the urban poor claiming their right to the city through the establishment of informal settlements. Informal settlements, defined as unplanned residential areas where housing, shelter and services have been constructed on land to which the occupants have no legal claim, or which they occupy illegally, can therefore be seen as one of the many outcomes of unequal and uncontrolled urbanization. With the overall number of people residing in informal settlements globally estimated to be increasing by 10 percent each year, it is critical to understand the risks, costs and opportunities of this form of urban settlement, particularly in relation to the increasing environmental risk produced by climate change (Doberstein & Stager, 2013).

The risks associated with the combination of rapid urbanization and climate change therefore require that climate variability, and its relations to the socioecological, political and economic dimensions of life in informal settlements, are understood in more depth. Climate change projections indicate significant increases in the frequency and intensity of natural hazards, in particular storm events and floods, which are the natural hazard most frequently experienced by the urban poor. The location of informal settlements on floodplains, and their insufficient waste and drainage networks, combined with higher runoff from hardened surfaces such as roads and pavements, compound the impact of flooding on the urban poor. Impacts from flooding include loss of informal housing, inundation, soil erosion, poor water quality, injury and death, as well as
disruptions to livelihoods and city economies, damage to homes, assets and public infrastructure, population displacement, and the spread of diseases (Doberstein & Stager, 2013).

2.7 MARGINALIZATION

The world is going through an unprecedented period of urbanization. Observers agree that at some point in 2008, a momentous milestone was reached, heralding a new urban era: for the first time in history, half of humanity, or 3.3 billion people, lived in urban areas (Davis, 2006; UN-Habitat, 2008). Massive urbanization is occurring not just in the feted megacities but in widespread faintly visible second-tier cities and smaller urban areas (Davis, 2004). Indeed, it is small and intermediate cities which contain the majority of the world’s urban population, as more than half live in cities of fewer than 500,000 inhabitants, and one-fifth in cities of between one and five million (UN-Habitat, 2006).

Urban growth rates are highest in the countries of the global south or the developing world, where cities grow by an average of five million new urban residents every month (UN-Habitat, 2008). According to UN-Habitat (2008), over the next four decades developing world cities will absorb 95 per cent of the world’s urban population growth. In cities where informal development is the norm rather than the exception, this means that urban growth will become virtually synonymous with slum formation in some regions (UN-Habitat, 2006). Estimates suggest that slums or informal settlements house almost one billion people or one-third of the world’s urban dwellers (UN-Habitat, 2008), a population characterized as a billion squatters by one observer (Neuwirth, 2005). Key characteristics usually associated with informal settlements are irregular land tenure, self-build housing, low level of infrastructure and residents with low incomes.
The price of this new urban order is increasing inequalities within and between cities (Davis, 2006). Although cities are the main motors of economic growth, and in general, urban populations have better access to services, there is evidence that urban poverty is becoming as severe as rural poverty, as informal settlement residents do not benefit from the advantages of living in the city (UN-Habitat, 2006). Incidence of disease and mortality is higher in informal settlements than in other urban areas, although this is often not reflected in national statistics, which mask urban deprivation. Informal settlements, then, are seen not only as a manifestation of poor housing standards, lack of basic services and denial of human rights, but also a symptom of dysfunctional urban societies where inequalities are not only tolerated, but allowed to fester (UN-Habitat, 2006). In this view, the increasing spread of informal settlements housing large numbers of the urban poor in low- and middle-income nations of the global South is nothing less than the ‘physical and spatial manifestation of urban poverty and intra-city inequality’ (UN-Habitat, 2003).

2.8 URBAN POOR VS RURAL POOR

The International Monetary Fund (IMF) states that poverty usually entails deprivation, vulnerability and powerlessness. However, these issues are sometimes inflicted on certain individuals or groups more than others. For example, women and children are more likely to experience poverty more intensely than men and minorities tend to suffer more greatly than other groups. The IMF reports that 63 percent of the world’s impoverished live in rural areas. Education, health care and sanitation are all lacking in rural environments. This causes many of the rural poor to move to cities, which often leads to a rise in urban poverty (Garrett, Hawkes, & Cohen, 2010).
The problems of the poor in urban areas are quite different from those in rural areas. Over 81 million people in urban areas live below the poverty line. The United Nations estimates that most population increase in the future will be reported from the urban areas itself by 2030, 165 million additional people are expected to be living in urban areas. What makes this statistic particularly disturbing is the fact that our colossal cities do not have the infrastructure to support such an increase in population. Cities are plagued with the unavailability of affordable housing options. Urban areas offer better healthcare and education, but only to the privileged. Around 1 in 4 people live in slums in urban areas. Compared to rural villages, there are indeed more job opportunities in urban areas (Garrett, Hawkes, & Cohen, 2010). However, many migrants lack the skillset to take on many jobs, and positions for unskilled laborers fill up quickly. This shortage of jobs leaves new residents without a steady income, which creates a series of new problems in the city. Without an income, the urban poor often find themselves in inadequate housing with poor safety and sanitation.

Health is quite variable throughout rural and urban settings. While the rural poor lack access to urban health care programs, they sometimes benefit from the distance between the country and the city. In the close quarters that characterize city living, it is easy for disease to spread. Additionally, communal resources in cities can actually lead to health problems. Families usually have their own personal latrine, so if a health problem starts among the family, the latrine can be closed off and the health risk minimized. However, in cities where many people on a daily basis use public restrooms, disease can spread rapidly and tracking down the source can be nearly impossible (Garrett, Hawkes, & Cohen, 2010).

Though rural poverty is currently higher than urban poverty, research shows that soon, urban areas will become home to the majority of impoverished people. The perception of greater
opportunity leads the rural poor away from the countryside and into the cities, where they often end up in even further poverty. An overhaul of urban development programs is necessary to combat the issues with sanitation, safety and hunger that propagate urban poverty (Garrett, Hawkes, & Cohen, 2010).

Poverty in rural areas is quite different. Typically, the rural poor are divided into two categories – cultivators and non-cultivators. The former are marginally better off than the latter. Cultivators can generate some form of income from farming activities. But this is also when lack of education becomes a problem. Poor illiterate farmers are out of touch with efficient farming practices. They only know one thing for certain that their children should not suffer from the same fate as them. They struggle to provide for their families and are heavily exploited by middlemen. The government schemes that are meant to make them financially dependent seldom make a difference in their life. The farmer in poor rural areas is at the mercy of ruthless middlemen, exploitative lenders and the unpredictability of nature. For non-cultivators, life is much more difficult. This is because they lack a stable source of income and work primarily as seasonal laborers on farms. Their pay is low and erratic. Fraught with worry and desperation, the rural poor flock to urban areas (Garrett, Hawkes, & Cohen, 2010).

One of the biggest challenges for urban areas is the problem of consumption. The promise of jobs and prosperity, among other factors, pulls people to cities. Half of the global population already lives in cities, and by 2050 two-thirds of the world’s people are expected to live in urban areas. But in cities two of the most pressing problems facing the world today also come together: poverty and environmental degradation (Garrett, Hawkes, & Cohen, 2010). Poor air and water quality, insufficient water availability, waste-disposal problems, and high energy consumption are exacerbated by the increasing population density and demands of urban environments.
Intensive urban growth can lead to greater poverty, with local governments unable to provide services for all people. Strong city planning is essential in managing these and other difficulties as the world’s urban areas swell.

Purchasing power parity conversion factor is the number of units of a country’s currency required to buy the same amounts of goods and services in the domestic market as U.S. dollar would buy in the United States. This conversion factor is for GDP. In 2018, purchasing power parity for Kenya was 50 local currency unit per international dollars. Between 1999 and 2018, purchasing power parity of Kenya grew substantially from 17.5 to 50 local currency unit per international dollars rising at an increasing annual rate that reached a maximum of 19.90% in 2006 and then decreased to 0.39% in 2018.

Poverty is a social deprivation because a citizen suffers poverty, has poor education, and has a low socioeconomic status. The concept of poverty is discussed using qualitative and quantitative measures as an indicator for social deprivation. Poverty can be absolute, relative, income based, consumption based, or entitlement based. The variation in the concept of poverty reveals its dimensionality. Poverty impacts on families, children and the whole of society and its consequences are far-reaching: creating problems of social isolation: low educational attainment: unemployment: impacting on mental and physical health and social interaction. It can be both relative for example someone may be living in overcrowded accommodation, whereas someone else may be homeless. It is also subjective, as individuals will place different priorities to various factors in their lives. Deprivation can be defined as the consequence of a lack of income and other resources, which cumulatively can be seen as living in poverty. The relative deprivation approach to poverty examines the indicators of deprivation, these can then be related back to income levels and resources (Garrett, Hawkes, & Cohen, 2010).
2.9 LIMITS OF KNOWLEDGE AND THE IDEA OF URBAN INFORMAL SETTLEMENTS

Accounts which frame the problem of urban informal settlements in this way leave little doubt as to their massive scale, not to mention the extreme inequalities they embody, and make a pressing case for action. But it is precisely the issue of what should be done, by whom, and how, about the problem of urban informal settlements, that has exercised academics and policy makers since these dysfunctional urban patterns were first perceived. As the above accounts show, some of the most prominent depictions of urban informal settlements have tended to conceptualize them in overwhelmingly negative terms. This is hardly surprising given the very real inequalities and injustices that occur daily in these settings, and the fact that such accounts of informality are frequently motivated by an underlying ideological concern with social justice.

However, ideological constructions of informal settlements may lack an understanding of the more prosaic or micro-level processes involved in making these places. The lack of understanding of these places is reflected in discourses in which particular narratives dominate, containing some problematic assumptions. It has been suggested that discourse is an important investigative object to understand the process of marginalization (Wilson & Bauder, 2001). Discourses are implicated in the construction of marginalization as these tales of reality are core ingredients in processes that marginalize (Wilson & Bauder, 2001). Here, discourse is taken to mean collections of words, meanings and images, projected as stories of reality with potentially powerful effects. In academic and policy fields, discursive marginalization may reveal gaps in understanding about urban informality, through the exclusion of certain perspectives or narratives, as well as through persistent negative interpretations of places and people.
Relating to negative characterizations of urban informal settlements, observers have highlighted the resurgent use of the term slum (UN-Habitat, 2003; Davis, 2006), and seen this as evidence of a worrying trend towards a generally negative and over-simplified universal image of informal settlements (Gilbert, 2007; Varley, 2008). The reproduction of terms like slum or squatter (Neuwirth, 2005), indiscriminately applied to places and people under the informal heading, obscures diversity and complexity. Indeed, it has long been suggested that two parallel urban histories exist; the official history and the other, that of low-income urban groups, meaning that the work undertaken by informal community or neighborhood organizations in providing basic services and site improvements for themselves when official agencies refuse to do so is a rich though poorly documented source of examples from which governments can learn much (Hardoy & Satterthwaite, 1989).

However, despite decades of research suggesting that formal and informal sectors are interconnected (Bromley, 1978; Moser, 1994; Ward, 2004), there is a continued emphasis in academic and policy discourses on the division between the formal and informal city. This has meant that urban informal settlements are often treated as outside normal urban considerations (Roy, 2005).

Such discourses may be reflected in urban policy, whether formally enshrined in legislation, or as enacted by local level urban authorities. The discursive marginalization of urban informal settlements may be used to justify policies with negative outcomes for residents, such as displacement, eviction and withholding investment. The physical or spatial layout of urban informal settlements, often portrayed as unplanned and disorderly, can be used as a pretext to justify redevelopment of settlements by the authorities, on health and safety grounds. For example, in the South African province of KwaZulu-Natal, the Slums Act of 2007 was used to
justify the demolition of slum settlements and the displacement of their mostly black populations (Hadland, 2008; Kane-Berman, 2008), despite being fiercely resisted by grassroots organizations (Abahlali, 2009; Huchzermeyer, 2007). In 2009 the Act was found to be in conflict with the South African Constitution by the national constitutional court (Huchzermeyer, 2011); however, settlement evictions which preceded the law have continued apace, suggesting that even where formal, legally enshrined policy is challenged, local level interventions are equally important in reflecting and reproducing specific attitudes towards urban informal settlements.

Evidence from other countries in Africa, Asia and Latin America suggest similar tendencies. Mass evictions from slums and squatter settlements have also occurred in Nigeria in 2006 and more recently (Huchzermeyer, 2007; Rolnik, 2009). In Zimbabwe, from 2005 Operation Murambatsvina involved mass evictions from informal settlements, costing at least 700,000 Zimbabweans their homes or livelihoods, and indirectly affecting up to a fifth of the country’s overall population, around 2.4 million people (Tibaijuka, 2005). In Asia, large scale evictions occur due to speculation, market forces, urban development and infrastructure projects (ACHR, 2003). Evictions in Mumbai, which are a regular occurrence, have been highlighted in the international media (BBC, 2009; Pinglay, 2009); while the number of violent evictions in China is rising as economic development and urbanization lead to increasing land values. In Latin American cities, despite historical decreases in eradication and eviction, recent evidence suggests a recurrence of these trends, with studies indicating that nearly 150,000 people were evicted in 15 Latin American countries between 2004 and 2006 (Fernandes, 2011). Even where eviction does not occur, marginalization may be socially and spatially reinforced, such as plans to build walls around favelas in Rio de Janeiro (Phillips, 2009). Responding to local and global economic and political forces, these interventions also suggest the damaging effects of discursive
marginalization in spatial terms, and support the impression that planning, as part of urban
governance, has contributed to exacerbating urban poverty in countries of the global south
through seeking to raise the costs of informality and to shift it spatially (Watson, 2009).

Thus despite years of research, and the many advances that have been made in both theory and
practice relating to urban informal settlements, the effects of stigmatization, discrimination,
eviction and displacement are still felt by millions of urban dwellers today. Some observers
suggest that this is reflective of critical gaps in urban theory, deriving from the dominance of
particular epistemologies and methodologies within urban studies, which have led to the
prevalence of apocalyptic and dystopian narratives of the slum (Roy, 2011). Such accounts
reveal the limits of knowledge about urban informality, based as it is on certain privileged
circuits of knowledge production which frame urban informal settlements in particular ways,
exemplified by the dualistic framework mentioned earlier. This may lead to sanctioned ignorance
(Spivak, 1999), the unseeing of the productive spaces of informality that constitute significant
 swathes of today’s cities; or to stereotyping of particular places and people in terms of their
illegal, illegitimate status in the urban environment. Both processes contribute to the
marginalization of urban informal settlements, and ensuing responses including eviction,
demolition and displacement as outlined above.

In response, it has been suggested that urban theorists must seek to understand how knowledge is
produced about these marginalized places (Roy, 2011). Exploring the limits of urban theory
through a detailed examination of how certain types of understanding about the city are produced
and reproduced suggests laying bare processes of knowledge production, and specifically, how
they can contribute to marginalization. In particular, this requires understanding how spatial and
social processes interact. Following Myers’ (2003) suggestion that in order to understand the
diverse pressures on urban space in the context of marginalization, the social meanings of the built environment must be interrogated, this paper seeks to explore the linkages between social and spatial elements of marginalization, through a focus on the socio-spatial construction of urban informal settlements as places. The aim is thus to critically examine understandings of informal settlements, in order to unsettle some of the assumptions underlying these understandings, and to examine how these relate to spatial and social marginalization at city level.

More specifically, this aim is pursued through foregrounding the spatial dimension of urban informal settlements, using critical social geographic conceptions of place, and employing place-making as an analytical lens. Place-making is seen here as the construction of place by a variety of different actors and means, which may be discursive and political, but also small-scale, spatial, social and cultural. As a means of understanding the socio-spatial nature of construction, it is used to capture the messy, dynamic and contextualized processes that construct urban informal settlements, which may include the role of discourses in constructing specific marginalized places. Thus while place-making has the capacity to link individual and collective constructive efforts in place, it also illuminates the relationship between social and spatial marginalization. In this sense, it contributes to the objective of highlighting gaps in urban theory and the limits of knowledge about these places, by relating to particular empirical and theoretical debates.
2.11 THE EXISTENCE AND EFFECTIVENESS OF DISASTER RISK MANAGEMENT INITIATIVES ON THE URBAN POOR AT URBAN INFORMAL SETTLEMENTS

Countering the negative aspects of informal settlements requires governments to recognize the challenges residents face and actively include them in wider city systems. However, the regularization of settlements may not overcome the stigma associated with living in certain areas. UN-Habitat (2015) identifies a number of key drivers for action:

Recognition of informal settlements and human rights. Urban authorities that adopt rights-based policies and integrated governance create prosperous, sustainable and inclusive cities.

Government leadership. National governments must provide enabling environments to develop and implement appropriate policies to bring about change. Government at all levels must connect key stakeholders, harness local knowledge, enact policies and plans and manage incremental infrastructure development.

Systemic and citywide/at-scale approaches. Initiatives work best when they capitalize on agglomeration economies; use innovative financing and taxes; ensure equitable land management; recognize multiple forms of employment; reintegrate informal settlements with infrastructure and services via planning and design; clarify administrative responsibility for peri-urban areas; and undertake sensitive planning to avoid exposure to environmental hazards.

Integration of people and systems. Governments must develop and coordinate broader integrated frameworks that are underpinned by urban planning, legislation and finance arrangements; are supported by interconnected institutional arrangements; and ensure the inclusion of marginalized groups and key stakeholders. Participation must be at the heart of this approach, ensuring an understanding of economic and social community dynamics.
Housing. The provision of affordable, adequate housing, including in situ upgrading and avoidance of forced evictions, security of tenure and livelihood and employment generation, all play a role in urban prosperity.

Long-term financial investment and inclusive financing options. Sustained investment in affordable housing and upgrading programmes is critical. This includes pro-poor housing plans and financing support for all tiers of government.

Developing participatory, standardized and computerized data collection. Residents of informal settlements should be engaged in local data collection. Data collected at community level must be standardized and linked to city, regional, national and global comparative indicators. Data collection must also be embedded in monitoring and evaluation processes.

Peer learning platforms. Platforms that draw on stakeholders’ knowledge should be prioritized to facilitate peer learning. These platforms may include a range of communication strategies and multimedia mechanisms.

2.12 CONCLUSION

The growth of informal settlements are very difficult to prevent especially in developing countries where policies to check urban population growth are inadequate and lacking. The upsurge of population density of informal settlement makes them hotspots to disaster as it directly and indirectly raises hazard vulnerability and levels of exposure. In addition, the interaction of disaster hazards with existing informal settlement vulnerability and exposure serves as disaster traps to the poor mostly residing there. Because the eruption of disaster hazards cannot be prevented, it is therefore imperative to reduce the vulnerability and exposure levels. With regards to this, the policy environment i.e. social, environmental/land use and
communication policies provides a strong foundation to which disaster vulnerability and exposure can be reduced to mitigate disaster risk. The sound implementation of a good social, environmental/land use and communication policies alter informal settlement characteristics and reduce vulnerability and degree of exposure, which invariably reduces disaster risk.
CHAPTER THREE: RESEARCH METHODOLOGY

3.0 INTRODUCTION

This chapter discusses the research methodology. The section concerns the methodological aspects of the study with a chronological outline of the methodology. It begins with a highlight of the research design, followed by a look on the study population. Next, the sample design and the data collection methods used are delved into. The chapter then looks into the description of data analysis techniques employed. Lastly, the limitations of the study and measures to counteract them are discussed.

3.1 RESEARCH DESIGN

In this research study, a descriptive research design was used in the collection of data and analysis. Kohari (2004) states that descriptive research is focused on specific preconditions which include the narration of facts and characteristics that concern individuals, groups and specific situations related to the research. The research is obliged to obtain data on the existing phenomena under research. It important to be aware that the researcher has no control over the variables but can only provide a report of what is happening (Kohari, 2004).

Descriptive research design helps provide answers to the questions of who, what, where, when and how which are related to the particular research problem. Descriptive research is used to obtain specific information that concerns the current status of a specific phenomenon under research with respect to variables or conditions in a situation (Krishenblatt-gimblett, 2006). Using the descriptive research enables the researcher to collect large amounts of data that is used for detailed analysis as compared to other designs. It also yields of rich data which leads to important recommendations being generated.
3.2 POPULATION OF THE STUDY

A population is defined as an assembly of people or things that use a single or added features where the data can be collected and examined (Ball, 2001). A research population generally includes a large collection of individuals that are selected to take part in a research due to their knowledge contribution. The target population consisted of residents of Mukuru Kwa Njenga. Mukuru Kwa Njenga’s population is 10,032 people. They were a mix of men, women, the youth, children, and people with disabilities within the settlement. Representatives from the Kenya National Disaster Operation Centre equally took part in the research.

3.3 SAMPLE DESIGN

The extraction of the sample size is generally a tedious process in the preparation of a particular statistical study. The main reason to sample is to save time and money. The ever increasing need for a representative statistical sample in empirical research has created the demand for an effective method of determining sample size. To address the existing gap, Krejcie & Morgan (1970) came up with a formula for determining sample size for a given population for easy reference that will be useful for this study.

The formula for determining sample size is the Krejcie and Morgan’s sample size formula:

\[ s = \frac{X^2 NP(1-P)}{d^2(N-1)} + X^2 P(1-P) \]

Based on \( p = 0.05 \) where the probability of committing type I error is less than 5% or \( p<0.05 \)

where,

\( s = \) required sample size.
$X^2$ = the table value of chi-square for 1 degree of freedom at the desired confidence level $0.05 = 3.841$.

$N$ = the population size.

$P$ = the population proportion (assumed to be 0.50 since this would provide the maximum sample size).

$d$ = the degree of accuracy expressed as proportion (0.05).

Mukuru Kwa Njenga population is 113,032 people.

Therefore, $N = 10,032$

$s = 3.841^2 \times 10,032 \times 0.50 (1 - 0.50) \div 0.05^2 (10,032 - 1) + 3.841^2 \times 0.50 (1 - 0.50)$

$s$ = sample size = 32

With a sample size of 32, the respondents were divided as:

Men = 7

Women = 8

Youth = 10

Children = 2

People with disabilities = 3

Kenya National Disaster Operation Centre representatives = 2

Total = 32
3.4 DATA COLLECTION METHODS

To achieve its objectives, this study made use of both primary and secondary data.

3.4.1 Primary Data

The primary data was collected by means of informal interviews on focus groups with the residents of Mukuru Kwa Njenga during a tour of the settlements. It also included interviews with representatives from the Kenya National Disaster Operation Centre that deals with the management and coordination of disaster and emergencies response at a national level in Kenya. This is under the Ministry of Interior and Coordination of National Government.

The oral interviews was utilized exhaustively. Interviews were able to help the researcher establish a rapport with the potential participants and therefore helped in gaining their cooperation. Through interviews the researcher was able to clarify ambiguous answers when appropriate and then seek follow-up information.

The respondents who took part in this information gathering provided key information on the various challenges affecting the effectiveness disaster risk management initiatives at Mukuru Kwa Njenga. They engaged in a discussion on various aspects of the settlement’s vulnerability to disaster risks.

3.4.2 Secondary Data

In order to reach the aforementioned objectives, the study included a research intended to consolidate secondary data. The secondary data included available census data, official documents, case studies of successful intervention and good practices with an emphasis on results achieved on the central city slum, and other relevant secondary literature. In addition, this
assessment was based on existing information from electrical journals, books, government documents, newspapers, reports such as the most recent UN-HABITAT Global Reports on Human Settlements and State of the World Cities Reports and other relevant publications available.

The collection of secondary data involved reviewing and utilizing the existing relevant literature and policy documents on vulnerability and hazards. The emphasis was placed on analyzing existing disaster risks, causes and resulting local needs; local capacities for risk reduction and their implications for resident’s livelihoods; and national and international contexts of vulnerability assessment as a means of mainstreaming disaster risk management into development processes.

3.5 DATA ANALYSIS

The data collected from the research was analyzed using a qualitative method. The data analysis for the study was also descriptive. Data from the fieldwork and interviews was checked for completeness, consistency, uniformity and accuracy.

3.6 LIMITATIONS OF THE RESEARCH

a.) Limited Knowledge of Mukuru Kwa Njenga

Since it is a slum-like informal settlement, Mukuru Kwa Njenga was a tough neighborhood to navigate through while conducting the study. In addition, there were numerous places within the settlement that were very unfamiliar. This was however mitigated by a community resident who had knowledge of the area very well.
b.) Communication Barriers

Since not all people were forthcoming to engage in interviews, communication was a problem. A research assistant who was equally the community guide assisted in engaging the residents of Mukuru Kwa Njenga into dialogue and subsequently facilitated smooth interviews.

c.) Language Barriers

Language barriers can exist where there are people who are not well conversant with English as their official language. Since the questionnaires are in English, the research assistant had to translate the questions to Swahili for a majority of the Mukuru Kwa Njenga respondents to understand during data collection.

d.) Expectations of Monetary Reward

A majority of the residents of Mukuru Kwa Njenga who took part in providing information for this study requested for a financial stipend for assisting in getting the findings as a form of gratitude. Nonetheless, we informed them that due to high ethical values that we had to uphold when carrying out the research, we were not allowed to pay the respondents hence we were not able to provide them with any incentive to voluntarily take part in the research as equally stated in the consent form for the questionnaire.

e.) Research Fatigue

We experienced some resistance from many of the Mukuru Kwa Njenga respondents in providing data. They complained that they keep on giving information on the ground regarding their plight in disaster risks and vulnerability to various organizations and government
representatives over and over but they still never received any results and hence they were tired of it. To mitigate this predicament we convinced them that we were coming from a fresh angle to find ways in improving the disaster risk initiatives and what would work best for them.
CHAPTER FOUR: FINDINGS OF THE STUDY

4.0 INTRODUCTION

The main objective of the study was to assess disaster risk management in urban informal settlements and its effectiveness on the urban poor. This is with Mukuru Kwa Njenga as the case study. The study was guided by the following specific objectives: to investigate the disaster risks in urban informal settlements and their effects on the urban poor at Mukuru Kwa Njenga, to examine the vulnerabilities of Mukuru Kwa Njenga residents to disasters risks and to assess the effectiveness of disaster risk management initiatives on the urban poor at Mukuru Kwa Njenga.

Mukuru residents face many varied threats within their neighborhoods. Its population growth has meant that residents settle in areas that are vulnerable to natural hazards that leaves Mukuru residents at great risk from the consequences of these hazards that leads to lost lives and property. But residential density/congestion is a major barrier to this. During the study, participating residents were asked about different types of risks, the consequences of the risks they identified, what actions they are aware of or have taken to address these consequences, and what they see as the barriers to actions.

The analysis of this objectives was done thematically. Based on these objectives, this chapter presents the research results, analysis, discussion and in depth interpretation. The data collected from this study involved the use of face to face interviews as well as secondary resources that have enabled the researcher to gather concrete data to answer the research questions. The following is an analysis and discussion of the findings relating to the various research questions.
4.1 QUESTIONNAIRE RETURN RATE

The questionnaires were administered to 32 persons living in Mukuru Kwa Njenga slum in Nairobi County and representatives from the Kenya National Disaster Operation Centre who had been sampled by the researcher. A total of 27 persons responded. This is a return rate that is equal to 84.4% which can be regarded as very good since Hartman & Hedborn (1979) states that a 50% return rate is adequate, 60% is good and 70% or above is very good.

4.2 DEMOGRAPHIC INFORMATION

The respondents were requested to give information about themselves relating to their experience and designations. This information was essential in determining whether these variables had an impact on the responses of the persons residing in Mukuru Kwa Njenga in Nairobi County in relation to disasters in the slum.

4.2.1 Distribution by duration of stay in Mukuru Kwa Njenga

Research findings indicate that a majority of the respondents have been in the slum for more than ten years (60%) meaning that they understand the slum life and disasters that have occurred in the last ten years at the least. Those whose duration of stay in Mukuru is less than three years are 10% while those with three to ten years are 30%. These long periods of stay in Mukuru Kwa Njenga slum has helped the persons residing in the slum to give responses that could be relied upon.
Distribution by duration of stay in Mukuru Kwa Njenga

- More than 10 years: 60%
- 3-10 years: 30%
- Less than 10 years: 10%
4.3 DISASTER RISKS IN URBAN INFORMAL SETTLEMENTS AND THEIR EFFECTS ON THE URBAN POOR AT MUKURU KWA NJENGA

Objective 1: To investigate the disaster risks in urban informal settlements and their effects on the urban poor at Mukuru Kwa Njenga.

Finding 1: Disaster risks in urban informal settlements and their effects on the urban poor at Mukuru Kwa Njenga.

4.3.1 Fires

Fire tragedy was cited as the disaster that had affected the most residents within the past one year. Fire related disasters were rampant in Mukuru Kwa Njenga as a result of fire outbreaks since it was observed that most people in Mukuru use firewood to cook food.

Lawlessness (27.4%) and ignorance (25.7%) are the leading causes of fire disasters in Mukuru Kwa Njenga slum. Those lawless residents eventually cause fire disasters that affect many residents of the slum. This finding is in line with the tragedy of the commons theory where Hardin employed a key metaphor, the Tragedy of the Commons to show why when a resource is held in common, with many people having ownership and access to it, a self-interested rational actor will decide to increase his or her exploitation of the resource since he or she receives the full benefit of the increase, but the costs are spread among all users. The remorseless and tragic result of each person thinking this way, however, is ruin of the commons, and thus of everyone using it. Most of the lawlessness and ignorance follows under this category by Hardin where individuals just think of their personal benefits but in doing so they end up causing harm to all the slum dwellers. This indicates that law enforcement agencies that include county administrators have a task to undertake in eradicating ignorance and bringing to an end the
lawlessness in the slum. Carelessness at (19.9%) also needs to be tackled if fire disasters are to be minimized or even brought to an end in the slum. Other causes of fire in Mukuru Kwa Njenga include natural accidents at (5.1%), illegal connections at (17.4%), and others at (4.5%).
Fire outbreaks are a big problem in Mukuru Kwa Njenga. According to some of the respondents, the worst fire outbreak in the settlement occurred where over 100 houses were completely burnt down and a large number of people injured and displaced. Since then, a number of fires normally erupt, especially during the dry spells, which further lead to destruction of houses and property. During the 2007 post-election violence, quite a number of houses in Mukuru Kwa Njenga set ablaze as a result of the post electoral animosity that flared up. Mostly, fires are triggered by stoves, charcoal burning, tin lamps, faulty electrical connections and even deliberate jealousies triggered by animosity or malice. Fires are dreaded, especially if they occur at night and during dry spells since water to put out the fires is a major problem.

According to one person with disabilities on a wheelchair in Mukuru Kwa Njenga, when fires erupt he experiences a very difficult time. He said, “Whenever fires outbreaks occur, I greatly suffer. At my state, it is already difficult for me to move from point A to B unless I have my wheelchair. So you can imagine how much of a nightmare it is for me when fire erupts around me especially at night.”

Fire hazards normally lead to some people being burned, residents being left homeless, houses being razed down and general loss of property. Fire outbreaks are attributed to the overcrowded conditions, the type of materials the houses are built of, and lack of access roads for fire fighters, lack of water to fight the fire, and sometimes domestic quarrels and ethnic animosity. It was also reported that during such incidences, some people take advantage to steal from the victims and those who have volunteered to help, the worst being at night. In addition, the help they get is normally not enough. The lack of a clear firefighting plan for the settlement, coupled by a poor road infrastructure for easy access in addition to intermittent water supply all serve to show that fires can turn into significant disasters in Mukuru Kwa Njenga.
In schools where there were boarding facilities, the numbers of fire extinguishers were few and would not effectively put out a fire. In addition, the emergency exits were hard to come by or were available but were either locked tight or were blocked by other erected buildings. Matrons were also not resident in the schools. First aid kits are available in most of the schools. The available kits, however, lack most of the tools needed in the kit. The kits were maintained by student clubs within the schools such as Guidance clubs, First Aid clubs, Scouts clubs and the Life skills clubs because of the high turnover of the teaching staff or absentee teachers which necessitated the school management to leave the kits in the hands of students.

The respondents (76%) claimed that equipment used in fire disaster response are out of date hence unhelpful in fire disaster response. These equipment include water buckets and small fire extinguishers located at chiefs camps.

The issue of lack of access to water was reported as a major impediment to putting out the fires if and when they occur. The residents do not seem to have access to firefighting equipment like fire extinguishers. Lack of lighting within most villages in Mukuru Kwa Njenga also serves to complicate rescue efforts, especially in instances of these fires breaking out at night. However, these fires never resulted into any fatalities but destroyed lots of property. The fires easily spread within the homes and even beyond due to the nature of building materials, which are easily combustible, used in the construction of the buildings.

4.3.2 Floods

The most significant hydrological and meteorological hazard that affects Mukuru Kwa Njenga is floods. When it rains heavily, a nearby river channel in Mukuru which is already clogged with debris fills to capacity and spills into neighboring areas. In one incident, a school compound was
flooded for more than one week and the school activities had to be moved to a nearby residential building until the flood waters subsided. There were also cases of raw open sewage flowing through the school compounds while in some cases; the sewage was flowing right outside the school gate making it difficult for the students to access the school. The ever present foul smell and insects from the sewage are a great hazard to the health of the students.

Floods have been occurring in the settlement in an almost predictable cyclical pattern. For instance, most of the respondents still recall the veracity of 1998 El Nino floods that swept away most of the houses that were constructed along Nairobi River. According to most of the respondents, flooding occurs every year during the rainy season. In some cases, rains cause flooding downstream in Mukuru Kwa Njenga and the bursting of the river banks of the rivers. The floods mostly affect the residents who live next to the rivers. Those with mud floors also suffer as the houses become inhabitable. The residents are sometimes forced to move to other houses, but sometimes due to poverty, they continue to live in these houses.

The general impacts of floods reported during the study include people being displaced, drowning of adults and children, houses being washed away, collapsing of houses and houses being filled with mud. This also leads to the outbreak of waterborne diseases and the destruction of property and infrastructure such as bridges.
According to one old man in Mukuru Kwa Njenga, the worst floods to ever hit the area were during the El Nino rains in 1997/1998. He said, “fatalities have been reported when a number of people have drowned or been washed away while trying to retrieve these things from the river.” This fact was supported during the targeted one on one interview with some key respondents which elaborated further that the El Nino floods affected the whole settlement. Quite a significant number of people died while others were displaced. Houses were washed away, with bridges, roads, and sewer facilities being rendered unusable.
The interview discussion further reported cases of people, especially students and those who are drunk, drowning as they attempt to cross the flooded rivers during rainy season. The residents recalled that in February 2010 about six people drowned as they tried to cross the flooded river and that several houses close to the river were also swept away. The heavy rains in December 2009 also caused floods in the area and structures close to the river were either destroyed or swept away. Normally, the flooding situation can last for 2 to 3 days. Mukuru villages have schools which are located near a river, further enhancing the exposure of the students to flood related vulnerability. During floods, the school programme is not only disrupted but the pupils are also exposed to water-borne diseases and other related health hazards when they resume.

During rainy seasons, the river also swells, sometimes breaking the banks and sweeping away the houses. Above normal rainfall can indeed have catastrophic consequences for the Mukuru Kwa Njenga dwellers, and if the evidence from the 1998 El Nino episodes are anything to go by, more efforts should be applied to ensure that the residents are cushioned from the rather increasing frequencies of flood events associated with climate change settlements.

4.3.3 Demolitions

Mukuru Kwa Njenga respondents indicated that the places that had experienced hazards majorly experienced demolitions. Majority of the hazards occur due to the constant demolitions of structures forcing residents to scamper for safety and in the process endangering their lives. The demolitions often occur due to the lack of proper documentation of the parcels of land on which they lie. The study also found out that illegal electric connections in Mukuru Kwa Njenga were prevalent. Most of the electric cables were part of the illegal connections and have therefore been disconnected by the electricity authorities who cared not to properly remove them. Some of the
illegal electric connections were still in place at the time of the study and they were obtained from nearby power lines.

Hundreds of residents at Mukuru Kwa Njenga would spend the nights in the cold after their houses were demolished. The demolitions would start in the wee hours finding most residents unaware. The demolitions would come after the government gave those encroaching on private land to leave. Houses constructed along road reserves, railway lines, power lines and pipelines’ right-of-way are set for demolition across the country. More than 100 structures in Mukuru Kwa Njenga were brought down in a process to protect infrastructure from damage and bring sanity in the construction industry. The government in partnership with relevant authorities had served owners and families of targeted locations with notices to evacuate encroached lands. Uncertain of what was to come, some residents of Mukuru Kwa Njenga near Imara Daima started to move their property, but others were not so lucky.

According to some of the residents, they saw a police car that came at night and told them to go into their houses and nothing would happen then a few minutes’ later 10 land cruisers and a tractor showed up. The demolition saw over 300 houses and businesses flattened. Mukuru residents also accused Kenya Power when demolishing 2,000 structures in Ondokea Laini operation for their predicament accusing them of going against a court order barring them from eviction.

15,250 unsafe structures in informal settlements in Mukuru Kwa Njenga, Imara Daima, Mukuru Kwa Reuben and Sinai village have been cleared since December 2018 and Kenya Power is continuing its operations of pulling down illegal structures built on power wayleaves. The
demolished structures were illegally built on the 100km stretch reserve known as a wayleave that stretches 5,300km countrywide.

Kenya Power said houses should be built at a width of 20 metres on either side of a 220KV powerline, on a line of 132KV should be built at a distance of 15 metres. Owners had been notified to remove their structures to create a safety corridor and space for maintenance of the lines. Kenya Power demolitions rendered numerous families homeless in Mukuru Kwa Njenga. Bulldozers moved from building to building shouldered by heavy police presence as residents salvaged the little they could. At least 50 families were rendered homeless in the first phase of the demolitions by Kenya Power.

4.3.4 Disease Outbreaks i.e. Cholera

Nine people died and 60 others admitted at the Mukuru Community Centre Hospital in Mukuru Kwa Njenga Slums and Kenyatta National Hospital in critical condition due to cholera outbreak in Mukuru Kwa Njenga informal settlements. The nine people were reported to have consumed food from an unlicensed food vendor who was operating in open air. The residents said the deaths came despite the ministry of health and area chief’s move to ban roadside food vendors. The outbreak was blamed on poor sanitation and low levels of hygiene. A representative from the Kenya National Disaster Operation Centre indicated that “the water is dirty and the levels of hygiene are poor, thus the cholera disease is spreading fast.”

4.3.5 Pest Infestations i.e. Bedbugs

Mukuru Kwa Njenga residents ask the government to move swiftly and assist them to fight bedbugs. The residents said that the bugs have invaded most homes and have rendered them sleepless nights. A female resident stated, “We are suffering sleepless nights. The nasty bug keep
us and our children awake with an itch that cannot be ignored.” She said the infestation has been in the slum area for a while but has been ignored.

Normal infestation is just a matter of hygiene but in Mukuru Kwa Njenga the case is different. The residents claim to have sprayed all manner of insecticides and everything they have been told, but apparently the more they spray the more they multiply. Majority of the slum dwellers are now embarrassed and can rarely invite visitors with fears of spreading the menace to other places.

Another resident said it was high time they sought interventions from other places.

“This bedbug infestation can only be addressed by officers from Governor Sonko’s office. Given Mukuru Kwa Njenga’s past dismal record in disaster responsiveness to anything, the bedbug menace should not be ignored. There are health officials who can assess and advise accordingly,” she said.

The worst is that bedbugs are a poor man’s burden thus if one cannot afford a professional fumigator, they will have their way with you.

4.4 THE VULNERABILITIES OF MUKURU KWA NJENGA RESIDENTS TO DISASTERS RISKS

Objective 2: To examine the vulnerabilities of Mukuru Kwa Njenga residents to disasters risks.

Finding 2: The vulnerabilities of Mukuru Kwa Njenga residents to disasters risks.

As established, the process of conducting vulnerability assessment is a comprehensive exercise that requires an analysis of detailed myriad important variables that have strong bearings on the issue of vulnerability. Indeed, the scope of this study was to conduct a rapid analysis of hazard
vulnerabilities and disasters within an informal urban settlement in a developing country. This study has succeeded in detailing a broad vulnerability assessment to understand the risks inherent in the myriad of informal settlements that have sprouted in Mukuru Kwa Njenga.

Mukuru Kwa Njenga remains highly vulnerable to disaster hazards. People with disabilities, women and children in Mukuru Kwa Njenga informal settlements continue to be the hardest hit by disaster hazards. Increased vulnerability among residents in informal communities is a major facilitator to the rising devastating impacts. Furthermore, changes in climate and environmental related factors have also been indicated as another cause of an upsurge in disaster impacts. These changes and related factors as well as widespread vulnerability do not adequately explain the escalated consequences of disaster hazards. Also, the inability of informal settlement dwellers to monitor and predict accurately these changes is another explanation to the rising impacts of disaster hazards.

The respondents indicated that Mukuru Kwa Njenga had experienced hazards with the most common ones being fire outbreaks, flooding, demolitions, disease outbreaks and pest infestations. The hazards mentioned were both man-made and natural hazards facing Mukuru Kwa Njenga residents. A majority said that there had been injuries during the hazards. A similar percentage said there had been life loss in such hazards. All the respondents said there had been property loss during the hazards.

Many petroleum deports in the slum along Nanyuki road should have been controlled or disallowed altogether since they are potentially very dangerous. For instance, the Sinai fire tragedy is one such disaster that resulted from a pipeline that runs through the Mukuru slum. Most of those who perished were attempting to scope oil spilling from the pipeline when the
disaster struck. This is in agreement with the tragedy of the commons that suggests that self-interested rational actor will decide to increase his or her exploitation of the resource since he or she receives the full benefit of the increase without due consideration to their safety, but the costs are spread among all users.

The residents were particularly quick to highlight and condemn this state of vulnerability upon the women, children and people with disabilities. However, this contradictory situation and views by the residents could be explained by the desperate situation of poverty that slum dwellers find themselves in that forces them to repel law enforcers that would haul them into nowhere and stop their selfish interest that eventually leads to their ruin as commons. Most of the respondents said that there are no laws that govern the conduct of the residents in terms of settlement in Mukuru Kwa Njenga slum and another suggested that the few informal laws existing in relation to settlement are not put into practice/enforced to improve on disaster risk management in the slum. However, some respondents agreed to the fact that law enforcement could actually results in community safety from disasters while other respondents claimed that abiding by the laws, help mitigate and manage risk disasters. It was the opinion of many respondents that they were not comfortable with the law enforcement levels in Mukuru Kwa Njenga in relation to disasters that rendered them vulnerable.

Safety is also compromised in Mukuru Kwa Njenga due to the absence of a proper fences around the houses, the persistent chaotic scenes within the environs, lack of ever present guards, the presence of exposed electric cables and wires in the buildings and the existence of precarious buildings. Some houses are also erected in dangerous places such as on top of other buildings. Half of the respondents felt safe while the other half did not feel safe when assessing the vulnerability status of Mukuru Kwa Njenga.
Policies and strategies to enable resilience in informal settlements should have vulnerability reduction as an integral part. Methods to build resilience in informal settlements that relegates vulnerability issues against the background may fail to achieve its established purpose. Though several studies abounds in the area of vulnerability reduction in general but research to reduce vulnerability specifically in informal settlement are lacking.

**4.5 THE EFFECTIVENESS OF DISASTER RISK MANAGEMENT INITIATIVES ON THE URBAN POOR AT MUKURU KWA NJENGA**

Objective 3: To assess the effectiveness of disaster risk management initiatives on the urban poor at Mukuru Kwa Njenga.

Finding 3: The effectiveness of disaster risk management initiatives on the urban poor at Mukuru Kwa Njenga.

The study looks at the role of the Kenya National Disaster Operation Centre in disaster risk management initiatives in Mukuru Kwa Njenga

There was an overwhelming positive response to the question as to whether the Kenya National Disaster Operation Centre leads to disaster risk management in Mukuru Kwa Njenga slum. 90% of the respondents claimed that the Kenya National Disaster Operation Centre could greatly lead to disaster risk management. This corroborates with the claim that in Africa about one billion people who live in slums are vulnerable to disasters because of poorly built houses and a lack of emergency services (Red Cross report, 2009). However, there are great hindrances to efforts in enforcing laws in Mukuru slum thus the Kenya National Disaster Operation Centre becomes unable to effectively maintain law to avoid disaster. Some of the difficulties that they face in doing so include political interference, presence of illegal gangs that make it impossible for the
public administrators to maintain law in the slum and inability of the county council to stamp
authority over the happenings in the slums in Nairobi.

The table below indicates the various forms of lawlessness that are prevalent in the Mukuru Kwa
Njenga that could lead to disasters.
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<tbody>
<tr>
<td>Illegal electricity connections</td>
<td>31%</td>
</tr>
<tr>
<td>Unplanned settlements</td>
<td>25%</td>
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<tr>
<td>Unplanned informal structures</td>
<td>23%</td>
</tr>
<tr>
<td>Resistance to law enforcers</td>
<td>21%</td>
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<td>Total</td>
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A majority of the respondents (70%) strongly agreed that the Kenya National Disaster Operation Centre have a role in helping enforce the law to mitigate and manage disasters but also agreed to the fact that the law enforcers are not welcome in Mukuru Kwa Njenga slum. This was linked to political interference and the presence of illegal gangs that command. Political interference was particularly quoted in relation to the issue of slum built on a pipeline. The efforts of the county commissioners have been thwarted by politicians citing loss of voters.

A majority of the respondents strongly agreed that Mukuru Kwa Njenga slum is unsafe from disasters and that it is not easy for the law enforcers to assist the residents in case of such emergency due to hindrances from politicians and rapid unplanned urbanization. This is evidenced by the frequent tragedies that have hit the slum as indicated in the table below. A majority of the respondents agreed that there are illegal electricity connections that make the slum prone to disasters. Most of the crimes in the slums are as a result of poverty and some of the crimes identified are illegal power connections, illegal constructions and siphoning of petroleum products from the pipeline.
The Kenya National Disaster Operation Centre respondents claimed that they have made numerous efforts in reducing disasters in Mukuru slum. They educate the residents in the slum and especially those who have built structures on access roads. This has however been hindered by politicians interference. They also sensitize the residents on disasters during monthly barazas held in the various villages. The have also been working closely with Kenya Power and Lighting Company to end illegal tapping of electricity. The biggest hindrance has been that these illegal connections and settlements resurface as soon as the Kenya National Disaster Operation Centre administrators are through with clearing them.

The residents who were interviewed suggested that law enforcement could lead to disaster risk management in the following ways. They said that law enforcement could be improved through community policing and increasing the number of policemen and stations within the huge slum.
The data collected indicated clearly that community enlightenment /education leads to disaster risk management. This was claimed by 93% of the respondents residing or working in Mukuru Kwa Njenga slum. The respondents were particularly positive about the contributions of the enlightenment that they also received from the Red Cross Society and G4S Security Company on fire drills that has greatly equipped them with the skills in fighting fires.

These trainings have however been irregular and not well coordinated. The Kenya National Disaster Operation Centre has been carrying out sensitization workshops since 2006 in various
community/church halls and continues to do so up to now. Respondents claimed that these trainings have not only helped them manage disasters better but have also tried to stop them. They also targeted teachers in schools and educated them on pre and post disaster response and it is hoped that they impart the same knowledge to their pupils.

According to Lyall (1996) the main reason for failure in disaster risk management is the lack of awareness on the part of the slum communities. There is a big agreement between what Lyall (1996) said and research findings since 65% of the respondents said that lack of awareness lead to high disaster risk in Mukuru Kwa Njenga slum in Nairobi County. 89.8% of the respondents claimed that the Kenya National Disaster Operation Centre administrators have a role to play in the enlightenment and education of residents on disaster risk management.
Residents get disaster preparedness training and education 13%

Residents attend educational meetings on disaster preparedness training 11%

Residents are generally aware of the potential disaster risks 12%

The levels of enlightenment on disaster risks are high in Mukuru Kwa Njenga 10%

Residents’ involvement and enlightenment could help in the mitigation and management of disasters 44%

Residents feel and actually get empowered to prevent and deal with disasters from enlightenment offered 10%

Residents’ enlightenment responses on disaster risk management initiatives in Mukuru Kwa Njenga

The knowledge of residents on management of fire outbreaks was scanty, indicating a general lack of preparedness on their part. From the table, 13% of the respondents felt that the residents mostly get disaster preparedness training and education in church halls and Tom Mboya
community Hall and open grounds. This is mainly disseminated by the Red Cross Society, G4S and Fire Safety Association of Kenya. 83% of the respondents claimed that they have never been given basic training on disaster risk management and less than half of the respondents have ever participated in a disaster drill. This translates to 89% of the respondents claiming that they do not get disaster preparedness training and education. This is an alarming percentage that many do not know what to do to prevent or deal with disasters. 11% of the respondents said residents attend educational meetings on disaster preparedness training. These meetings are usually organized and addressed by the Red Cross Society especially after a disaster and the number of residents attending dwindles with time due to the fact that most of the residents are poor and are more bothered by putting some food on the table and not their security. The Red Cross attracts trainees by providing to them meals and other inducements like food staff to keep them listening if not attending. This happened at Star of Hope primary school and Tom Mboya community hall after the Sinai fire tragedy in September 2011 that claimed more than a hundred Kenyans. This was reported by the Standard Newspaper on 13th of September 2011.

The above attendance rate is a very low percentage and it means that the residents are generally not aware of what to do during disasters. 12% of the respondents said that residents are generally aware of the potential disasters while only 10% claimed that the levels of enlightenment on disasters are high in Mukuru slum. 44% of the respondents said residents’ involvement and enlightenment could help in the mitigation and management of disasters while 10% of the residents suggested that Mukuru residents feel and actually get empowered to prevent and deal with disasters from enlightenment offered. The respondents further suggested that community education and enlightenment by county public administrators like village elders, chiefs and sub county administrators could further reduce disasters or help in their mitigation and management.
by training them on disaster drills, firefighting coordination, prevention and being more careful in handling disaster. Kenya National Disaster Operation Centre representatives interviewed claimed that there are regular training/educating workshops that they organize in church and community halls but have fizzled out due to poor attendance and lack of training continuity since they have now become untenable. These meetings are usually attended by the unemployed youths who are normally idling in the slum. The Kenya National Disaster Operation Centre representatives have been helping in clearing the access roads during disasters as well as in alerting firefighting agencies such as the Nairobi city fire department, National Youth Service, Red Cross, private companies like the G4S.

Viwandani H20 self-help group usually deals selling of water to the slums assists during fire disasters by providing free water to help in putting out the fire. This self-help group works jointly with Jamaica Youth group that focuses on fire fighting in the slums. Church organizations such as St. Monica’s Catholic Church women group, Viwandani PCEA women guild and men fellowship help in counseling and provision of building materials.

Majority of the respondents (87%) were of the view that disaster response plans help in disaster risk mitigation and management while 13% were of the opinion that disaster response planning does not help in disaster mitigation and management in Mukuru Kwa Njenga. For instance, after the fire tragedy in May 2009 in Mukuru Slum, the government gave 637 households a total of Ksh. 3000 each as one month’s rent to help in relocating the residents who were affected. In the same year, Kenya Power and Lighting Company made great efforts in trying to forcefully evict or remove slum residents who were living under high voltage power lines. This was in an effort to evade future fire disasters. According to residents who were interviewed, the Sinai fire tragedy, just like many other incidences was complicated by lack of access roads in the slums.
The government has tried to open up access roads in the Mukuru Kwa Njenga slum but hasn’t succeeded yet due to the vast nature of the slum and mushrooming of other structures on roads initially cleared. The respondents interviewed said that efforts to relocate the victims from the pipeline bore fruits but other structures have since come up. The victims in this tragedy also got counseling and humanitarian aid from the government and well-wishers at Tom Mboya community hall and Star of Hope Primary School. This counseling was as well aired on Kenyan television stations to try and assist as many as possible. Fire drills were conducted by the Red Cross after the fire tragedies in Sinai and land mawe villages in 2013. Goal Kenya has been organizing sensitization workshops in the slum with a view to not only avoid disasters but also to enable the residents respond in a more coordinated and knowledge based way.

Of the respondents, 81% felt that Mukuru Kwa Njenga slum doesn’t have a good disaster response plan. This claim agrees very well with the claim that disasters are common in Nairobi’s slums but urban disasters receive a baffling lack of response from aid agencies, indicating major gaps in urban disasters preparedness. There are disaster management committees in place from the village to sub county level. These are charged with the responsibility of coordinating post disaster activities as well as trying to preempt eminent disasters by taking action or reporting to the commissioner for action.

92% of the respondents claimed that planning disaster response is extremely important. Of the respondents, 93% felt that planned urban settlement and planned housing in urban informal settlements is very important in disaster response planning. However due to lawlessness and self-centeredness of individuals living in the slum, they continue to build structures, tap electricity and endanger their lives and that of their neighbors as suggested by the tragedy of the commons.
Mukuru slum resident’s interest in disaster response planning is unimportant as was claimed by 60% of the respondents. The same number of respondents does not attach a lot of value to planned response to disasters. Disasters response and management is hampered by unplanned urban settlement as was suggested by 89% of the respondents. It was the opinion of majority respondents (77%) that disaster response planning by the Kenya National Disaster Operation Centre in Mukuru Kwa Njenga slum is inadequate while 19% think that it is totally lacking. This fact could be corroborated with the many disasters that people continue to witness in the slum responses on frequency of Kenya National Disaster Operation Centre administrators educating the residents and stakeholders on disaster response plans.

![Mukuru Kwa Njenga Frequency on Disaster Risks Education](image)
The graph indicates that there is hardly any disaster response plans education conducted by disaster management administrators in Mukuru Kwa Njenga slum in Nairobi County. A majority of the respondents (43%) claimed that there has not been any disaster response plans education while 23% are unsure whether there has been any community enlightenment on disaster response plans carried out by the disaster management administrators.

The disaster management administrators do not carry out disaster response plans checks in Mukuru Kwa Njenga slum nor do they provide feedback after evaluating the slum communities’ disaster response plans further worsening the situation. The Kenya National Disaster Operation Centre administrators interviewed claimed that they give the feedback but the residents are ignorant and do not attend meetings intended to give such information. The slum settlement is claimed to be a total hindrance to disaster response plans since there are no access roads in the slum to enable on time disaster response. This problem is compounded by the housing structures in Mukuru slum that are not safe at all for they are constructed with highly flammable materials such as cartons, timber and woodcuts. The respondents said that disaster response planning help in availing equipment on time, training the community on response activities and coordination in disaster risk management.

92% of the respondents claimed that indeed reconstruction coordination helps in disaster risk management. However, according to 67% of the respondents, Mukuru Kwa Njenga slum in Nairobi County doesn’t have a good post disaster reconstruction coordination that could help in disaster risk management while 73% claim that disaster management administrators do not carry out post disaster reconstruction coordination and leave the task to non-governmental organizations such as the Red Cross and G4S. In post disaster reconstruction, the Kenya National Disaster Operation Centre administrators claimed that they have been useful in mobilizing funds
and issuance of documents damaged during disasters. They also undertake food and basic necessities distribution assisted by community health workers self-help groups. Other groups are also involved in post disaster reconstruction. These include Viwandani Pamoja Youth Group. This group assists in rescuing people as well as creating way for fire engines during disasters. Mukuru slum development programme offers counseling to victims as well as providing proper materials for reconstruction.

It was accepted by 59% of the respondents that post disaster reconstruction coordination could hasten recovery from fire disasters in Mukuru Kwa Njenga thereby mitigating the adverse effects of such a disaster. 43% of the respondents are happy with post disaster reconstruction coordination by groups other than the Kenya National Disaster Operation Centre administrators. The respondents (64%) said that fire disaster reconstruction is not adequately coordinated in Mukuru Kwa Njenga slum while 50% claimed that the area doesn’t have post disaster reconstruction coordinators. Those who acknowledged the presence of disaster reconstruction coordinators in the slum claimed that they are not adequately knowledgeable or available during disasters. It was evident that post disaster reconstruction coordination was hindered by unplanned slum settlement and that recovery from fire disasters takes unnecessarily long due to lack or poor reconstruction coordination.

70% of the respondents claimed that lack or poor pre and post disaster reconstruction coordination leads to other disasters. As depicted, the Mukuru Kwa Njenga respondents rated the Kenya National Disaster Operation Centre administrators post disaster reconstruction coordination as very good (9%), good (11%), average (37%), poor (42%), while (1%) remained non-committal on their effectiveness. These figures indicate the need to reevaluate the role of administrators in post disaster reconstruction coordination.
Post disaster reconstruction coordination was also noted to help in disaster risk management by ensuring access roads are left and housing units are constructed using less vulnerable materials. This coordination also helps victims to get counseling that they need to carry on with their lives.
The respondents identified a combination of other factors that could help in disaster risk management. Most of the respondents (53%) residing in the slum and those interviewed claimed that the disaster risk management administrators must take a bigger role in disaster management and reconstruction. 28% of the respondents claimed that poverty alleviation could help the residents take less risks thereby avoiding fire disasters, 46.9% suggested that a total reconstruction of the informal settlement was useful, 5% felt that the informal settlement should be formally allocated to the inhabitants ensuring all fire safety requirements are observed while another 5% thought government policies in relation to informal settlements could be of use.

The Kenya National Disaster Operation Centre administrators who were interviewed were of the opinion that the solution lies with the residents of Mukuru Kwa Njenga taking the responsibility of ensuring their own safety from disasters by reporting cases of lawlessness and the members of illegal gangs that make it difficult for law enforcers and by becoming more careful when handling disasters.

The common coping strategies employed in dealing with the risk hazards include, seeking refuge and help from friends and relatives, seeking refuge in the community center, moving to other areas e.g. rural homes and efforts at community mobilization to stop the disaster from spreading.

With regard to coping strategies, some residents have tried to develop some coping strategies to deal with problem of floods. In some instances, the use of natural stones and rocks to act as artificial dykes, the process of digging trenches around the house to drain away the excess waters in addition to that of raising the base of the houses. Still, these are only short term measures that would only be effective during normal rainfall regimes, in instances of heavy and continuous rainfall, these measures would not be able to save the residents from becoming homeless.
Normally, the residents temporarily move to safer places or higher grounds, dig channels to facilitate free flow of water and use soil bags or tyres to divert the water. In some instances, the most affected receive tents, food and medicine from Red Cross, government and other well-wishers.

Mukuru Makao Bora Trust - MMBT is an independent not for profit community initiated organization registered under the Trustees Perpetual Succession Act in the Republic of Kenya. MMBT provides avenues for the urban poor living in informal settlements with a chance to own a decent and affordable shelter with security of land tenure free from evictions and demolitions. MMBT was founded in the year 2006 by victims of forced evictions and demolitions in the slums of Mukuru Kwa Njenga in Nairobi. The community started the project as a Self Help Group called Mukuru Sisal Settlements, with a few members and later upgraded to a Trust in 2012 with over 2,221 members. The project is owned and managed solely by the community as a way to enable them own decent and affordable shelter with security of land tenure. MMBT strives to enable people living in informal settlements own the land they depend on and be able to build better houses through savings, and provide social basic necessities through funds from donors.
CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 INTRODUCTION

The findings presented should be able to support ongoing efforts by the key stakeholders in developing an appropriate urban disaster risks management strategy in Mukuru Kwa Njenga. If effectively implemented, they should be able to improve the capacity of decision makers at local and national level to measure key elements of disaster risk and vulnerabilities for communities, with particular regard to urban informal settlements. In addition, these findings should provide a tool for comparative parameters for monitoring changes in disaster risk as a measure for evaluating effects of policies and investments in disaster management.

For developing countries like Kenya, the issue of urban informal settlements will be a long term one, hence such information and data will continually remain useful to the planners. This study has highlighted the major deficiencies in dealing with natural disasters and indicates possible intervention measures. In future, there is need for the collection of timely information on the hazards, disasters, exposures and vulnerabilities is systematically collated, compiled and presented by the disaster institutions in the country.

5.1 SUMMARY

The issue of disasters in Mukuru Kwa Njenga are real challenges that residents have to grapple with almost on a daily basis. They have developed some local adaptation strategies, which are short term and reactive, but will be able to benefit from the Mukuru Kwa Njenga Slum Upgrading Programme which has demolished some houses in order to expand the infrastructure.
The issue of vulnerability of Mukuru Kwa Njenga to such hazards is a factor of the quality of houses, livelihoods and socio economic resilience. Indeed, there is need for research and application of cheaper construction materials for houses within the informal settlements. There exist numerous models for constructing cheap but durable and more resilient houses internationally, but no efforts whatsoever at Mukuru Kwa Njenga level to introduce better building materials. The lack of a cogent land use plan for the area further complicates the problem. People seem to build anywhere, even within clearly established flood plains and river banks. Houses have even been constructed right next to dumpsites, further exposing the community to immeasurable health related hazards.

The health situation is complicated by the over reliance on pit latrines and the failure by the County Council to provide an articulate network of sewer line to facilitate sanitation and hygiene. There are many exposed sewer lines, even right next to houses. These gaping trenches flowing with raw sewer need to be dealt with, before they explode into a fully-fledged cholera epidemic. The water piping network in Mukuru Kwa Njenga is not secured, and in some cases, the pipes had even burst. Hence the risk of contamination is eminent.

The coping strategies by residents of the Mukuru Kwa Njenga slums are wide and varied. Mostly, these coping strategies exhibit the inherent socio-economic characteristics of the residents. This is specifically driven by poverty, since the cheaper of the houses are located in areas within Mukuru that are even more marginalized, probably located in a riverine, next to a dumping site, adjacent to the open sewer lines and/or close to some neglected dumpsite. These are the areas where the qualities of houses are weakest. To such people, the issue of vulnerability to hazards doesn’t occur. The quest to survive seems to override the obvious dangers associated
with health, floods, fires and drought hazards. The key challenges to mainstreaming disaster risk management in informal settlements in Mukuru Kwa Njenga are presented as:

5.1.1 Neglect of Urban Disasters and Risks

From the foregoing, there was insufficient evidence of deliberate efforts to deal with the problem of disaster risks within urban informal settlements in Nairobi. It seems that the key players have decided not develop proactive strategies to effectively deal with the problems that are likely to occur within informal settlements that have huge populations. To a large extent, local authorities have been ignoring urban risk from extreme hazards. And worse, national governments and international organizations have been neglecting cities in setting disaster risks priorities and providing funding support, respectively. Hence, physical vulnerability of existing environment constitutes one of the biggest threats to urban dwellers.

5.1.2 Weak Institutional Arrangements

In most developing countries, legislative and institutional arrangements inhibit rather than enable local action. While it is recognized that disasters are initially local events, accountability, authority and resources are not sufficiently decentralized to enable local governments to assume ownership and take actions to manage disaster risk effectively.

5.1.3 Lack of Political Feasibility

Politicians, administrators, and community leaders all face conflicting priorities, and disaster risks almost invariably takes the back seat to other needs which may be considered more pressing or easier to solve. Risk is not managed preemptively, but thought of in terms of something to be dealt with when disaster strikes through emergency response and humanitarian
assistance. Further, the inadequate of experience, methodology and standards for benchmarking make disaster risks an unattractive proposition for local officials.

5.1.4 Insufficient Knowledge, Experience and Capacity

Disaster risk management is complex. It takes time, effort, tools, and training to assimilate disaster risk management in city functions and ongoing operations. Significant deficiencies remain throughout cities and megacities in terms of inter-institutional coordination, warning systems, incident command and control, resources for response, relief, recovery, and rehabilitation practice.

5.1.5 Towards shaping the path of urban development

Poverty-environment linkages are dynamic and context-specific reflecting both geographic location and scale and the economic, social, and cultural characteristics of individuals, households, and social groups. In rural areas, poor people are particularly concerned with secure access to and the quality of natural resources - arable land and water, crop and livestock diversity, fish and bush- meat resources, forest products and biomass for fuel.

For the urban poor, water, energy, sanitation and waste removal, drainage, and secure tenure are key concerns. Poor women regard safe and physically close access to potable water, sanitation facilities, and abundant energy supplies as crucial aspects of well-being, reflecting women’s primary role in managing the household. As urban centers develop into new frontiers of human settlement, the quest for sustainable urban development needs to be guided by appropriate legal frameworks, good urban governance principles, sound housing/infrastructural plans and a realization that disaster risk management as captured under the Hyogo framework guides the expansionist tendencies of urban growth.
5.1.6 Towards adaptation as a sustainable recourse

In this regard, the concept of sustainable development recognizes that both inter and intra generational equity needs to be safeguarded even as societies seek to develop. Sustainable development introduces very strongly moral responsibility, social justice, equity and equality in sharing of natural resources. It proposes for the utilization of environmental resources for industrial actions to be done with sufficient safeguard mechanisms that will ensure that such use does not result in gross plunder of the same resources.

5.2 CONCLUSION

Mukuru Kwa Njenga is an urban informal settlements in urban areas faced with a number of environmental hazards. This is largely attributed to high poverty, lack of social infrastructures as informal settlements tend to exist outside the formal provisions budgets of many urban authorities and due to the very high population densities characterizing these areas. Some of the environmental hazards in Mukuru Kwa Njenga include pollution, fire, electric faults, floods, demolitions, sanitation challenges, disease outbreaks, pest infestations among others. The lack of essential disaster risk management initiatives results to people in informal settlements being highly exposed to many hazards. Within the informal settlements are vulnerable people such as women, children and the disabled who usually exposed to the hazards and they greatly suffer from the disasters. This study addressed the issue of disaster risk management initiatives in urban informal settlements with Mukuru Kwa Njenga slum in Nairobi as the case study. This study assessed whether disaster risk management initiatives are there, how effective they are, and if they are actually in place, what are their hindrances and challenges they face in achieving their
goal because disasters still keep occurring upon the urban poor in Mukuru Kwa Njenga rendering them to have vulnerability to the hazards and disasters from the findings.

5.3 RECOMMENDATIONS FOR FURTHER STUDIES

Finding 1: Disaster risks in urban informal settlements and their effects on the urban poor at Mukuru Kwa Njenga.

Recommendations:

Develop appropriate land use systems for urban areas including Mukuru Kwa Njenga.

Assess the socio economic characteristics of urban informal settlements to the projected scenarios of climate change.

Good governance at the county level as a measure of enhancing the responsiveness of the local authority to disasters and hazards in informal settlements.

Promote the adoption of sustainable livelihoods at the local level as a means of increasing the resilience within communities resident in urban informal settlements.

The government should address the issue of ownership rights of land for people living in urban informal settlements.

Finding 2: The vulnerabilities of Mukuru Kwa Njenga residents to disasters risks.

Recommendations:

Analyze the vulnerability of urban informal settlements to health related hazards and disasters.
Develop dynamic models that would serve to provide a responsive link between poverty and vulnerability within urban informal settlement.

Reduce the informal settlements’ vulnerability to hazards and disaster through application of best practice strategies.

Policy makers and stakeholders in Nairobi County to make policy recommendations for sustainable management of disaster risks and hazard vulnerability.

Finding 3: The effectiveness of disaster risk management initiatives on the urban poor at Mukuru Kwa Njenga.

Recommendations:

Enhancing the adaptive capacity of Mukuru Kwa Njenga residents through enhancing the role of community structures in managing hazards and disasters.

Enhance disaster risk awareness, preparedness, management and risk reduction at the local urban informal settlement level.

The use of GIS to map out all the hazards/disaster hotspots within urban informal settlements in Nairobi’s informal settlements.
REFERENCES


inequalities in Health and Environment in Accra, Ghana and Sao Paulo, Brazil” Environment and Urbanization vol. 9 No. 1 pp. 181-202.


APPENDICES

QUESTIONNAIRE A

AN ASSESSMENT OF DISASTER RISK MANAGEMENT IN NAIROBI'S MUKURU KWA NJENGA INFORMAL SETTLEMENTS

Date of interview ________________________________

Name of the respondent ________________________________

SECTION A: BACKGROUND INFORMATION AND HOUSEHOLD CHARACTERISTICS AND CONDITIONS AT THE TIME OF STUDY

Gender:

Male

Female

Age:

18-25 years

26-35 years

36-40 years

41-45 years

46-50 years

Above 50 years
**Relation to household head:**

Household head

Spouse

Son/daughter

Brother/sister

Father/mother

Other relative

Non relative

Worker

Other (specify) _________________

**Education level:**

None

Primary

Secondary

Above secondary

**Occupational status:**

Regular (formal) employment
Temporary (formal) employment

Self-employed/informal sector

Casual labor

Unemployed (looking for a job)

None (student/child)

Home maker

Other (specify) _______________________

Number of household members _________

In which year did you come to Nairobi? __________

In which year did you come to Mukuru Kwa Njenga? _________

Have you ever lived in another informal settlement? [1] Yes [2] No If yes, which one(s)?
_____________________________________________

SECTION B: LIVELIHOODS, INCOME AND EXPENDITURE

What are the household’s sources of livelihood (i.e. income and food-generating activities)?

(Type of occupation e.g. urban farming, rural farming, social networks, etc.)
____________________

What is the household’s present income situation per month in Kshs?


Roughly how much does this household spend on food per month? _________________

Roughly how much does this household spend on health care per month? _______________
SECTION C: DISASTERS IN THE SETTLEMENTS

Has Mukuru Kwa Njenga ever experienced any of these disasters and when?

<table>
<thead>
<tr>
<th>Disaster</th>
<th>Yes/No</th>
<th>Which year(s)?</th>
</tr>
</thead>
</table>

How did these disasters affect the people of this area?

Fires  __________________________________________________________

Floods  __________________________________________________________

Demolitions  _____________________________________________________

Disease epidemics  _______________________________________________

Pest infestations  _______________________________________________

How did the people cope with the situation?

Fires  __________________________________________________________

Floods  _________________________________________________________
Demolitions ________________________________

Disease epidemics ________________________________

Pest infestations ________________________________


Fires ________________________________

Floods ________________________________

Demolitions ________________________________

Disease epidemics ________________________________

Pest infestations ________________________________

If yes, what kind of assistance and from who?

Fires ________________________________

Floods ________________________________

Demolitions ________________________________

Disease epidemics ________________________________

Pest infestations ________________________________
SECTION D:  KNOWLEDGE ON DISASTER RISK MANAGEMENT


If yes, how did you know about it and what do you know about it?
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________

Have you ever witnessed or experienced disaster risk management at Mukuru Kwa Njenga?

If yes, in what way(s)?
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
QUESTIONNAIRE B

AN ASSESSMENT OF DISASTER RISK MANAGEMENT IN NAIROBI’S MUKURU KWA NJENGA INFORMAL SETTLEMENTS

Date of interview ________________________________

Name of the respondent ________________________________

SECTION A: DISASTERS IN THE SETTLEMENTS

Has Mukuru Kwa Njenga ever experienced any of these disasters and when?

<table>
<thead>
<tr>
<th>Disaster</th>
<th>Yes/No</th>
<th>Which year(s)?</th>
</tr>
</thead>
</table>

How did these disasters affect the people of this area?

Fires                                                                                             

Floods                                                                                             

Demolitions                                                                                         

Disease epidemics                                                                                   

102
Pest infestations

How did the people cope with the situation?

Fires

Floods

Demolitions

Disease epidemics

Pest infestations


Fires

Floods

Demolitions

Disease epidemics

Pest infestations

If yes, what kind of assistance?

Fires

Floods

Demolitions
Disease epidemics

Pest infestations
SECTION B: KNOWLEDGE ON DISASTER RISK MANAGEMENT

Have you ever educated or enlightened Mukuru Kwa Njenga residents on disaster risk management?


If yes, in what way(s)?

______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
SECTION C: CHALLENGES ENCOUNTERED WHEN ADMINISTERING DISASTER RISK MANAGEMENT INITIATIVES

What problems do you encounter when administering disaster risk management initiatives in urban informal settlements?
CONSENT FORM

This informed consent form is for residents of Mukuru Kwa Njenga and representatives from the Kenya National Disaster Operation Centre who I am inviting to participate in a study titled An Assessment of Disaster Risk Management in Urban Informal Settlements and Its Effectiveness on the Urban Poor. Case Study: Mukuru Kwa Njenga.

Name of Principle Investigator – Fatuma Mohamed Ali

Name of Organization – United States International University – Africa (USIU – Africa)

Name of Research – An Assessment of Disaster Risk Management in Urban Informal Settlements and Its Effectiveness on the Urban Poor. Case Study: Mukuru Kwa Njenga

This Informed Consent Form has two parts:

• Information Sheet (to share information about the research with you)
• Certificate of Consent (for signatures if you choose to participate)

You will be given a copy of the full Informed Consent Form
Part I: Information Sheet

Introduction

I am Fatuma Mohamed Ali, a master’s student at United States International University – Africa. I am doing a study on An Assessment of Disaster Risk Management in Urban Informal Settlements and Its Effectiveness on the Urban Poor. Case Study: Mukuru Kwa Njenga. I am going to give you information and invite you to be part of this research. You do not have to decide today whether or not you will participate in the research. Before you decide, you can talk to anyone you feel comfortable with about the research. This consent form may contain words that you do not understand. Please ask me to stop as we go through the information and I will take time to explain. If you have questions later, you can ask them of me or of anyone else you feel comfortable asking.

Purpose of the research

The research intends to assess disaster risk management in urban informal settlements and its effectiveness on the urban poor with Mukuru Kwa Njenga as the case study.

Type of Research Intervention

This research will involve your participation in filling a questionnaire and will take about twenty minutes.

Participant Selection

You are being invited to take part in this research because you are a resident of Mukuru Kwa Njenga or a representative from the Kenya National Disaster Operation Centre and hence can contribute to our knowledge of disaster risk management in urban informal settlements and its effectiveness on the urban poor.

Voluntary Participation
Your participation in this research is entirely voluntary. The choice that you make will have no bearing on your job or on any work-related evaluations or reports. You may change your mind later and stop participating even if you agreed earlier.

**Procedures**

I am asking you to help me learn more about disaster risk management in urban informal settlements and its effectiveness on the urban poor. If you accept to take part in this research, you will be asked to fill out a survey which will be provided by Fatuma Mohamed Ali (me). You may answer the questionnaire yourself, or it can be read to you and you can say out loud the answer you want to be written down.

If you do not wish to answer any of the questions included in the survey, you may skip them and move on to the next question. The information recorded is confidential, your name is not being included on the forms, only a number will identify you, and no one else except me, the principal investigator will have access to your survey.

**Duration**

The research takes place over two months in total. During that time, I will visit you to share the questionnaire. In the event that I cannot visit you I will instead share a link with the questionnaire which you will submit online once you are done. It will take about twenty minutes for you to fill the questionnaire.

**Risks**

There is a risk that you may share some personal or confidential information by chance, or that you may feel uncomfortable talking about some of the topics. However, I do not wish for this to
happen. You do not have to answer any question or take part in the survey if you feel the question(s) are too personal or if talking about them makes you uncomfortable.

**Benefits**

There will be no direct benefit to you, but your participation is likely to help us find out more about disaster risk management in urban informal settlements and its effectiveness on the urban poor.

**Reimbursements**

You will not be provided any incentive to take part in the research.

**Confidentiality**

The research being done is for academic purposes. I will not be sharing information about you to anyone outside. The information that I collect from this research project will be kept private. Any information about you will have a number on it instead of your name. Only I will know what your number is and I will lock that information up with a lock and key. It will not be shared with or given to anyone except the university.

**Sharing the Results**

Nothing that you share will be shared with anybody outside the University, and nothing will be attributed to you by name. The knowledge that I get from this research will be shared with you at the end of the study.

**Right to Refuse or Withdraw**

This is a reconfirmation that participation is voluntary and includes the right to withdraw. You do not have to take part in this research if you do not wish to do so, and choosing to participate will not affect your job or job-related evaluations in any way. You may stop participating in the survey at any time that you wish without your job being affected.
Who to Contact

If you have any questions, you can ask them now or later. If you wish to ask questions later, you may contact:

Name: Fatuma Mohamed Ali
Telephone: +254702061069
Email: fatma.ali638@yahoo.com

This study has been reviewed and approved by NACOSTI, which is tasked to make sure that research participants are protected from harm.

You can ask me any more questions about any part of the research study, if you wish to. Do you have any questions?
Part II: Certificate of Consent

(This section is mandatory)

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions I have been asked have been answered to my satisfaction. I consent voluntarily to be a participant in this study

Name of Participant ______________________

Signature of Participant ______________________

Date ___________________________

Day/month/year

Statement by the researcher/person taking consent

I have accurately read out the information sheet to the potential participant, and to the best of my ability made sure that the participant understands that the following will be done:

1. The research is purely for academic purposes.
2. My identity will not be disclosed to anyone else outside of the principal researcher.
3. I can withdraw from the research at any point during the duration of the research.

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.
A copy of this Informed Consent Form has been provided to the participant.

Name of Researcher/person taking the consent __________________________

Signature of Researcher /person taking the consent __________________________

Date __________________________

    Day/month/year
DEBRIEF FORM

Thank you for participating in this study! We hope you enjoyed the experience. This form provides background about our research to help you learn more about why we are doing this study. Please feel free to ask any questions or to comment on any aspect of the study.

You have just participated in a research study conducted by Fatuma Mohamed Ali from United States International University – Africa (USIU – A).

As you know, your participation in this study is voluntary. If you so wish, you may withdraw after reading this debriefing form, at which point all records of your participation will be destroyed. You will not be penalized if you withdraw.

I do not expect to do follow-up surveys during future semesters. However, it is important that you do NOT talk (or write or e-mail, etc.) about this study with your colleagues and the questions contained in the survey. The main reason for this is that YOUR COMMENTS could influence the expectations, and therefore, performance of a future participant, which would bias our data. We hope you will support our research by keeping your knowledge of this study confidential.

You may keep a copy of this debriefing for your records. OR Please return this debriefing form to the researcher. Contact information for the researcher and/or contact person and NACOSTI is on your copy of the consent form which you may keep for your records.
If you have questions now about the research, please ask. If you have questions later, please contact:

Name: Fatuma Mohamed Ali  
Telephone: +254702061069  
Email: fatma.ali638@yahoo.com

If as a result of your participation in this study, you experienced any adverse reaction, please contact NACOSTI.
TO WHOM IT MAY CONCERN.

27th September, 2019

Dear Sir/Madam,

REF: PERMISSION TO CONDUCT RESEARCH – FATUMA MOHAMED ALI
STUDENT ID. NO. 639556.

The bearer of this letter is a student of United States International University (USIU) -Africa pursuing a Master in international relations.

As part of the program, the student is required to undertake a dissertation on “An Assessment of Disaster Risk Management in Urban Informal Settlements and its Effectiveness on the Urban Poor: Case Study of Mukuru Kwa Njenga” which requires her to collect data.

Please note that information provided will be treated with utmost confidentiality and will only be used for academic purposes.

Kindly assist the student get the appropriate data and should you have any queries contact the undersigned.

Yours Sincerely,

Prof. Amos Njuguna,
Dean – School of Graduate Studies, Research and Extension
Tel: 730 116 442
Email: amnjuguna@usiu.ac.ke
THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013

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