

**THE ADAPTIVE CAPACITY OF HOUSEHOLDS IN  
INFORMAL SETTLEMENTS IN RELATION TO  
CLIMATE CHANGE: TWO CASES FROM  
JOHANNESBURG**

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## **Declaration**

I declare that this thesis is my own, unaided work. It is being submitted for the Degree of Doctor of Philosophy in Town and Regional Planning to the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination to any other University.

Signature:

**16<sup>th</sup> day of October 2015**

## **Abstract**

Climate change poses serious challenges to households in informal settlements located in marginal areas such as flood plains that are sensitive to extreme weather events. This thesis explores the complex interrelationship between climate variability and informal settlements using two city-level case studies in Johannesburg, *viz.*, Msawawa and Freedom Charter Square. The main objective of this study was to establish the nature of household adaptive capacity in informal settlements in relation to climate change. This entailed assessing household vulnerability to the increased frequency and severity of extreme weather events such as strong winds, extreme cold, extreme heat, floods, drought and fire, as a basis from which to understand household adaptive capacity.

Methodologically, the thesis applied a mixed method approach combining quantitative and qualitative instruments to explore household adaptive capacity in relation to climate change. This methodology was used to understand how households have coped with and adapted to extreme weather events in the past. Secondary research involved analysing a range of published and unpublished documents, while the primary research component consisted of a survey of two hundred households across the two settlements as well as key-informant interviews with local leaders in the two informal settlements and relevant officials from the City of Johannesburg.

The results of this study show that in Msawawa and Freedom Charter Square, households' social and economic conditions such as those relating to employment, income, assets and health play a role in their vulnerability to climate change. The ability of households to improve their adaptive capacity is influenced by a range of factors that include access to physical capital, social capital, financial resources and governance. The research found that households in the two informal settlements rely mainly on coping mechanisms such as repairing their shacks after disasters related to

extreme weather. They have very limited ability to address underlying causes of vulnerability such as weak dwellings. Social capital is one of the drivers, although not very significant, for coping and critical to efforts for improving household adaptive capacity. The study also found that governance is a contested terrain in which it is difficult to recognise a positive impact on household adaptation to climate change. The study highlights the importance for policy-makers to recognise the need to improve household socio-economic conditions as well as building relationships of trust as drivers that could help in improving adaptive capacity and addressing household vulnerability to climate change.

## **Dedication**

This thesis is dedicated to Khuliso, Marubini and Maemu. It is also dedicated to my parents, William and Mukatshelwa Nenweli.

To my loving wife Sekinah Nenweli, for the unconditional support and encouragement throughout the course of this work. Thanks to the people who encouraged me, and this includes my brother Abel Nenweli and everybody at Mangondi village.

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## **List of Acronyms**

CBO	Community Based Organisation
CDE	Center for Development Enterprise
CoJ	City of Johannesburg
DEA	Department of Environmental Affairs
DPLG	Department of Provincial and Local Government
FBO	Faith-Based Organisation
GCRO	Gauteng City Region Observatory
GDARD	Gauteng Department of Agriculture and Rural Development
GTZ	German Agency for Technical Cooperation
ECSECCC	Eastern Cape Socio-Economic Consultative Council
HI	Habitat International
LED	Local Economic Development
IPCC	Intergovernmental Panel on Climate Change
LFP	Livelihoods and Forestry Programme
n.d.	Undated
NDEA	National Department of Environmental Affairs
NDHS	National Department of Human Settlements
NGO	Non-Governmental Organisation
NPO	Non-Profit Organisation
NUSP	National Upgrading Support Programme
SSA	Statistics South Africa
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNFPA	United Nations Population Fund
VD	Vienna Declaration



## **1. CHAPTER ONE: INTRODUCTION**

## 1.1. Introduction

Climate plays an important part in shaping landscapes and life (Pittock, 2009), but at the same time humans have an impact on climate. In recent decades, concerns have been raised about human-induced climate change that is superimposed on natural climate variability. Climate variability refers to the ‘variability in the average weather behaviour at a particular location from one year to another or one decade to another’, whilst climate change refers to long-term weather changes that result from human activities (*e.g.*, over centuries) (*ibid.*:2). Human activities are contributing to the emission of greenhouse gases which have been found to negatively affect the world’s climate system, with the variability ranges envisaged to increase (IPCC, 2007a). Evidence points to the fact that changes related to climate conditions can be attributed to such human activities as the burning of fossil fuels including oil and coal, leading to an increase in gases such as carbon dioxide (IPCC, 2014a; Parry-Davies, 2004). Consequently, greenhouse gases have led to the ‘unprecedented rapid global warming trend in last few decades’ (Pittock, 2009, p. 2). The ‘warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades’ (IPCC, 2013). This warming has led to global increases in average temperature and the frequency of hot days, intensity of heavy rainfall and the duration of heat waves, with a decrease in the frequency of cold days and frosts (IPCC, 2014a). Retreating glaciers, changing river flows, new patterns of extreme weather events (which can also be referred to as hazards) and altered ecosystems are interlinked signs that point to the fact that we are currently already experiencing changes in the global climate (Adger, Paavola, & Huq, 2006). Some of these extreme weather events have a significant impact on the quality of life of households residing in urban areas, especially those ‘living in poor-quality housing and exposed areas’ (IPCC, 2014a, p. 18).

It is envisaged that climate variability and change (hereafter referred to as climate change) will lead to adverse consequences, especially for some precariously placed

communities living in areas such as informal settlements with households living in high densities, often in marginal areas, rendering them vulnerable (UN-Habitat, 2011). Vulnerability is a concept that emanates from the food security and natural hazards literature (Eakin & Luers, 2006b). From a social perspective, IPCC (2007c, p. 93) defines vulnerability as,

‘the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and the rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity.’

The IPCC lists three key terms that are related to vulnerability, *viz.*, exposure, sensitivity and adaptive capacity. Exposure refers to the ‘presence of people, livelihoods, species or ecosystem, environmental functions, services, and resources, infrastructure, or economic, social, or cultural assets in places and settings that could be affected’ (IPCC, 2014a, p. 5). The terms sensitivity and adaptive capacity, which are also listed in the definition, are discussed later in Chapter 3.

For several reasons, informal settlements are more vulnerable to the impacts of climate change than are formal residential areas. Firstly, they have not been provided with adequate services, if any at all, and exist without vital infrastructure such as drainage systems which help reduce climate-related risks (UN-Habitat, 2011). Secondly, they are often on land not deemed suitable for formal development, including provision of such infrastructure and services, and therefore receive limited state assistance towards reducing risk (Dodman, 2010). Globally, the locations of informal settlements have been found to include swamps, dumps, floodplains, steep slopes, volcanic areas, railroad sidings, unstable hillsides and desert fringes (Davis, 2006). As stated by Davis (2006, p. 121), a typical informal settlement can be described as ‘geographically health-threatening and hazardous’. Davis (2006, p. 121) adds that ‘poor people have little choice but to live with disaster’. Thirdly,

households living in informal settlements also face socio-economic challenges such as poverty, social exclusion, inadequate housing, and overcrowding; and these increase vulnerability to risks related to climate change (UN-Habitat, 2003, 2011).

This vulnerability is expected to grow in the future, given the fact that the populations living in informal settlements are expected to continue to grow in the cities of developing countries around the world (Adeniji & Ogundiji, 2009; UN-Habitat, 2011), including in Johannesburg (Murray, 2008). It is estimated that the global informal settlement population was 712 million in 1993 and 837 million in 2001 (UN-Habitat, 2003). Developing countries have a higher population living in informal settlements in their urban areas as compared to developed countries. In 2001 this number was estimated to be 43% of the urban population, while it was 6% in developed countries (*ibid.*). In sub-Saharan Africa 'slum' residents in urban areas constituted 72% in 2001 (UN-Habitat, 2003) and this decreased to 62% in 2005 (UN-Habitat, 2009).

Global responses to climate change are categorised into coping, adaptation and mitigation on the one hand (Vincent et al., 2013, p. 1), *i.e.*, responding to the impacts of climate change or reducing the likelihood of the change (Pelling, 2011). The challenge of climate change requires mitigation and adaptation through the development of locally responsive policies, strategies, projects and programmes (Pelling, 2011). Generally, mitigation has been the main policy focus, and the United Nations Framework Convention on Climate Change (UNFCCC) has mandated its Parties (mainly national governments) to reduce their greenhouse gas emissions to levels that prevent dangerous anthropogenic climate change (UN-Habitat, 2011). Initially mitigation was 'commonly accepted as the dominant paradigm' and it remains important, but more recently 'adaptation policies are receiving more attention because anthropogenic climate change appears unavoidable' (Jennings, 2011, p. 238). Whereas mitigation is aimed at reducing greenhouse gases, adaptation involves protecting natural or human systems (reducing vulnerability) in response to the

changes in climate (Dang, Michaelowa, & Tuan, 2003). Adaptation may involve exploiting opportunities that arise from exposure to risk, in addition to moderating harm from climate related changes (*ibid.*). Signs of adaptation can be witnessed before (anticipatory) and after exposure (reactive) to hazards such as flooding, but much can be done to enhance existing adaptation practices (*ibid.*).

As noted above, climate change is already taking place and adaptation is important (IPCC, 2014a), particularly for households residing in informal settlements. Notably, not all households are vulnerable to climate change to the same degree. Thus, some households are ‘more subject to more-grievous losses than others are’ due to climate change (UNDP, 2014). At the household level, the main focus is over how people respond to the impacts of climate change, and it is important to understand their exposure and reactions. Of interest then, and central to this thesis, is the inherent ability of vulnerable populations, as well as the urban systems within which they live, to adapt, *i.e.*, their ‘adaptive capacity’, and the extent to which this can be enhanced at the household level to reduce the risks of future climate change. The IPCC (2007b, p. 21) defines ‘adaptive capacity’ as ‘the ability of a system to adjust to climate change (including variability and extremes) to moderate potential damages, to take advantage of opportunities, to cope with the consequences’. This implies that adaptive capacity has to do with the potential that people have, individually and collectively, to react to potential harm. At the household level, Vincent (2007a, p. 13) views adaptive capacity as a ‘vector of resources and assets that represent the asset base from which adaptation and investment can be made’. As already indicated, this is due to the fact that vulnerability is a function of exposure, sensitivity and adaptive capacity, and therefore adaptive capacity is a key part. Additionally, adaptive capacity can help in the determination of potential impacts of climate change on households, and this is key for local government planning and policy (*ibid.*).

When considering the levels of undocumented as well as documented migration into the City of Johannesburg (CoJ), it is unlikely that the city will be able to address its housing backlog through the provision of formal housing in the near future; consequently this may lead to the growth of informal settlements and the worsening of the household living conditions (CoJb, 2009). More households will thus be living in sensitive environments that are exposed to climate change while also having low adaptive capacity. The City of Johannesburg developed its adaptation strategy in 2009 (CoJ, 2010a; CoJb, 2009) and this is one aspect which makes it a relevant city context in which to locate this household level research. Further, citywide governance of adaptation is also an important of adaptive capacity and thus I will be looking at it in detail in Chapter 6. Through an exploratory approach, this study seeks to develop insights into the nexus between climate change adaptation and informal settlements – looking at the extent to which household responses are informed by, and in turn inform, the citywide approach. The study aims to help develop empirical evidence that will contribute to knowledge on the interconnection between climate change, mechanisms of adaptation, and informal settlements. Empirically, the study focuses on households in Freedom Charter Square and Msawawa informal settlements as the two case studies.

## **1.2. Problem statement and significance of the study**

South Africa's National Climate Change Response White Paper<sup>1</sup> states that climate change will inevitably have detrimental consequences that will 'disproportionately affect the poor' who constitute a large proportion of the South African population, especially those living in informal settlements in urban areas (NDEA, 2011, p. 9). The findings in the international literature about the vulnerability of informal settlements due to exposure to environmental hazards has also been confirmed for South Africa (Napier & Rubin, 2002).

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<sup>1</sup> In South Africa, the policy and legislation formulation process starts with a Green Paper, followed by a White Paper, and ultimately legislation follows (Bill and Act). The White Paper is the policy, while the Bill and Act are legislation.

The National Climate Change Response White Paper for South Africa raises concern that there is limited awareness of climate change within the South African government and civil society (NDEA, 2011). The White Paper also acknowledges the fact that the capacity of government and communities to respond to climate change needs to be built up (*ibid.*). Climate change poses challenges to all spheres of government in South Africa. These challenges include the need to respond to increased occurrences of droughts, floods, epidemics and other threats. The onus will be on local government to deal with these, working with the support of other spheres of government, consequently a better understanding of household exposure and responses to climate change could illuminate leverage points for local government action (UN-Habitat, 2011). Local governments across the globe need to be more prepared to deal with the impacts of climate change, based on the fact that it is the sphere of government that is the closest to households and that it also is at the forefront of service delivery (*ibid.*). In the City of Johannesburg, dealing with climate change adaptation by households is complicated by the fact that the City is at present already dealing with challenges related to backlogs in service delivery in relation to water, sanitation, electricity and housing (CoJ, 2010a).

Considering the limited resources and capacity at the disposal of government combined with on-going migration to cities as well as natural population growth, the challenge of informal settlements in South Africa is not expected to disappear soon and it is envisaged that climate change will add significant stress to the already-stressed livelihoods of households in informal settlements in urban areas such as Johannesburg (UN-Habitat, 2011). This will be exacerbated by other climate change related phenomena such as additional migration linked with threats to food security in rural areas, which will increase poverty and may lead to the growth of urban informal settlements (*ibid.*). This illustrates the complexity of the interrelationship between climate change adaptation and informal settlements. Furthermore, it is envisaged that climate change will add a strain on the capacity of local government to render

services to households considering the increased frequency of disasters that climate change may bring with it, especially in informal settlements (UN-Habitat, 2011). The fact that climate change adaptation is a new field and still fraught with uncertainties related to timing and the severity of its impacts (IPCC, 2014a) makes it difficult for local government, (including the City of Johannesburg) to justify investing appropriate resources (UN-Habitat, 2011) for contributing to the manner in which households could handle climate change impacts.

### **1.3. Rationale, aims and objectives for the study**

This study aims to add to the literature on climate change adaptation, focusing on vulnerable communities, especially those that reside in informal settlements. While widening our understanding in an important area for the city's future, the thesis will also contribute new knowledge that may help the City of Johannesburg in deepening its understanding of climate change adaptation and informal settlements. Therefore, this study aims to contribute academically to the body of knowledge on climate change in relation to urban areas by looking at the intersection between climate change adaptation and informal settlements through a household level analysis. The findings may inform policy development and inform communities on their adaptation capacities and how they can optimally use them. To date, studies in South Africa have explored informal settlements, adaptive capacity and adaptation mainly in isolation of one another. These studies have not explored the inherent complexity of adaptive capacity in conjunction with urban informal settlements. This is critical because the National Climate Change Response White Paper makes it clear that for South Africa to adapt to climate change there is need to conduct research, build capacity and develop technology at all levels of government (NDEA, 2011). It is, therefore, hoped that the findings of this study may also contribute to policy development while at the same time also providing a basis for raising awareness among informal settlement households of their adaptive capacities and how they can



enhance or optimise them. To some extent, this will be achieved through the research process and by presenting the findings to the two case study settlements, Msawawa and Freedom Charter Square. It is also envisaged that the findings may contribute to the refinement of the City of Johannesburg's Adaptation Strategy, which currently has minimal focus on informal settlements.

It is also worth restating that with the number of people living in 'slums' in sub-Saharan Africa in 2001 estimated to be more than 70% of the total urban population (UN-Habitat, 2003), the underlying context of this research is shared by countries beyond South Africa. By providing insights into the nexus between climate change, adaptive capacity and informal settlements at a local level, the study should be relevant to urban policy development in sub-Saharan Africa and Africa at large. This is further contextualised in the rationale, aims and objectives of this study.

The focus of this study is to establish the nature of household adaptive capacity in informal settlements in relation to climate change with a particular focus on two cases in the City of Johannesburg. This includes understanding the nature of household exposure and responses to climate change. To this end, the following objectives with related questions in Section 1.4 were explored:

- To determine the nature of household exposure to climate change in each settlement;
- To determine ways in which households in informal settlements have coped and adapted to climate change in the past and present and to assess what enables adaptive capacity; and
- To identify and evaluate the role of governance and local government in the adaptive capacity of households within informal settlements.

## 1.4. Research questions

The study explored the following research questions:

### **Overall research question:**

- What constitutes the adaptive capacity of households in informal settlement communities in relation to climate change?

The overall research question is addressed in the thesis through three objectives, each of which encompasses a number of sub-questions.

The first objective is to look at the ways in which households in informal settlements in the City of Johannesburg have been affected by climate change. Sub-questions within this objective include:

- To what extent do socio-economic factors determine the extent to which households are affected by climate change?
- In what ways have households in informal settlements in the City of Johannesburg been exposed to climate change?

The second objective is to determine ways in which households in informal settlements cope and adapt to climate change, and to explore what enables adaptive capacity. Sub-questions within this objective include:

- How have households in informal settlements coped and adapted to climate change?
- To what extent and through which resources may households in informal settlements be able to adapt to anticipated threats?

The third objective is to identify and evaluate the role of governance in the adaptive capacity of households within informal settlements. Sub-questions within this objective include:

- How participatory and effective is the City of Johannesburg's IDP and LED programmes regarding household responses to climate change in Msawawa and Freedom Charter Square?
- In what ways is participatory governance contributing to household exposure and responses to climate change in Msawawa and Freedom Charter Square?

### **1.5. Preamble on methods**

This study is empirical, aiming to interpret first hand information (Habtemichael, 2009). The justification for this choice is set out in detail in Chapter 4. This study used both qualitative and quantitative approaches for data gathering, therefore applying a 'mixed' approach. The intention was to have a method that combines thick descriptions and numerical data to build an argument in a complementary nature in order to develop a detailed picture on household adaptive capacity in relation to climate change. Mixed methods 'can permit the investigations to address more complicated research questions, to collect complementary data' (Gerring, 2007, p. 200), and also enable the researcher to 'gain richer contextual understandings of the phenomenon being researched' (Gray, 2009, p. 204). The purpose of applying mixed methods is important because the 'bias of methods from one paradigm is counter-balanced by the methods from the other' (*ibid.*:205).

The study is purposely based on the broader case of the City of Johannesburg, focusing mainly on households in two informal settlements that were purposely chosen, *viz.*, Msawawa and Freedom Charter Square. Data were collected using semi-structured interviews targeting key informants in the two informal settlements and in relevant departments of the City of Johannesburg. The data collection methods also involved document reviews and that helped in informing the survey design. The quantitative aspect of the study involved a survey questionnaire, which was

administered to gather data from two hundred households in the settlements. Survey data were captured and analysed using SPSS and it is presented in graphs and charts, while content analysis was used to analyse qualitative information that adds depth and explanations to the descriptive data from the quantitative survey. In my conclusion, I reflect on the merits of this approach for the questions this study sought to address.

### **1.6. Validity and Reliability**

Validity and reliability have bearing on the significance of the study findings. Validity ‘implies proper interpretation and use of information gathered through measurement’ (McMillan & Schumacher, 2001, p. 243). Therefore validity is a matter of degree rather than an all or nothing proposition (*ibid.*). Validity depends on choosing the right methodology for answering research questions (Manion, Morrison, & Cohen, 2000). Reliability means consistency and replicability over time and this means that a research study ‘must demonstrate the fact that if it were to be carried out on a similar group of respondents in a similar context, then similar results would be found’ (*ibid.*:117).

To ensure validity and reliability, this study relied on triangulation. Triangulation is defined as ‘the use of two or more methods of data collection in the study in some aspect of human behaviour’ (Manion, Morrison, Morrison, & Cohen, 2007, p. 141). This study relied on multiple data sources that include documents, information gathered through a survey and key informant interviews. Triangulation of both qualitative and quantitative data involves observing whether similar results come up when using different methods (*ibid.*). Differences are also looked into in order to understand emerging new patterns. In cases where there are differences in the findings, further assessments were undertaken to understand the causes. Furthermore,

literature from documents was used to determine if the findings related to existing knowledge.

### **1.7. Assumptions**

I made the following assumptions that guided the direction of this study:

- I have assumed that informal settlements are complex, with an array of forces that continuously shape them and the socio-political agency of households living in them. These settlements have no rigid boundaries and they are exposed to climate change;
- I also assumed that by focusing at the household level findings of the study would provide information that could help in shaping responses to climate change at a municipal level and beyond;
- The socio-economic circumstances of households are the main contributor to their exposure and sensitivity to climate change; and
- I also assumed that understanding household adaptive capacity is complex and influenced by various interconnected forces that are spatial, economic, social, political and cultural by nature.

### **1.8. Thesis Structure**

This thesis is composed of eight chapters. The first three chapters (including this one) introduce the research, outline the research gap, give the contextual background and explore theoretical issues related to informal settlements and climate change. This also includes a review of literature on governance (with a particular interest in participatory governance) and LED and the role this play in affecting household level

adaptive capacity in informal settlements. Other key concepts reviewed are vulnerability, coping, adaptive capacity and adaptation. Chapter 4 provides the methodology and context of the two study areas, explaining the research process, data collection and analysis methods, and laying a foundation to contextualise the findings. Chapter 5 – 7 present the findings of the study, while also linking the findings with literature. Lastly, Chapter eight concludes the study and proposes some recommendations emanating from the findings.

The second chapter reviews literature on informal settlements and their linkages with climate change. This includes defining informal settlements, providing some background on the nature of the challenge globally and how it plays itself out within sub-Saharan Africa, South Africa and the City of Johannesburg. The chapter provides the linkages between informal settlements, climate change, migration, governance and LED interventions by local government. It also attempts to highlight the positive benefits of informal settlements within the urban landscape and the various approaches that have been used by various stakeholders to improve or eradicate them.

Chapter 3 reviews literature on climate change adaptation, adaptive capacity, vulnerability and coping. It defines vulnerability, discusses different types of vulnerability and various schools of thought on vulnerability. It also focuses on adaptive capacity and its characteristics, urban vulnerability in relation to adaptive capacity as well as community-based adaptation and tools to assess climate change adaptation. In addition, the chapter discusses the interrelationships between the key concepts, *viz.*, vulnerability, resilience, coping and adaptation. The chapter also links the concept of climate change with informal settlements.

Subsequently, Chapter 4 gives insight into the research design, methodology and

theoretical perspective to be applied for gathering of empirical data. Furthermore, it outlines the information required to answer the research questions, the required data and how it was gathered. The chapter describes the methods that were used to address the research aim. It explains the approach to data collection, which included both primary and secondary methods. Primary data were collected using semi-structured interviews with key informants in the local community and local administration and a survey using a structured questionnaire. Secondary data were collected using literature reviews focusing on books, journal articles and other sources. Further, this chapter also provides the contextual information on the two informal settlements selected for the case studies – Msawawa and Freedom Charter Square.

The fifth chapter presents the study findings on the socio-economic status in the two settlements. This chapter uses the socio-economic set-up of the two settlements to understand household exposure to climate change. The chapter also provides empirical findings on household exposure and sensitivity towards climate change. The findings are also linked to literature reviewed in Chapters 3 and 4. It goes further to understand the nature of household exposure to strong winds, heavy rainfall, floods, extreme weather, drought and fire. Furthermore, the impacts of these events are assessed to understand the level of vulnerability of households in Freedom Charter and Msawawa. The chapter also looks at the types of households affected by particular effects related to climate change.

Chapter 6 presents the findings and discussion on household responses to climate change. The focus is on strong winds, extreme heat and cold, and their impacts in light of the demographic, social and economic findings. The discussion includes the identification of households that are engaging in coping activities for responding to the differential impacts of climate change. Furthermore, the chapter identifies how household responses impacts on their adaptive capacity and adaptation. It goes further

to look at the role of socio-economic and demographic factors on household responses to extreme weather events in the two settlements

The seventh chapter provides the governance context in the two informal settlements. The study focuses on the City of Johannesburg, using both Msawawa and Freedom Charter Square as the local foci. The chapter uses information from the survey and key informant interviews to understand the relationship between the households and City of Johannesburg. It also provides an understanding on the role that governance is playing in relation to household exposure and responses to climate change. Furthermore, the chapter looks at the role that local institutions are contributing to household exposure and responses to climate change. The chapter goes further to dissect the significance of the two key municipal programmes, *viz.*, IDP and LED, and understanding how they are contributing to the building of household adaptive capacity in Freedom Charter and Msawawa.

Finally, chapter 8 concludes this study by indicating the intellectual contribution that has been made to our understanding of the interconnection between climate change, household adaptive capacity and informal settlements within an urban context. The chapter summarises the answers to the research questions, before discussing policy applications and recommendations for future studies, reflections on the methods, and implications for engagements with local communities in informal settlement communities in the City of Johannesburg.



**2. CHAPTER TWO: INFORMAL SETTLEMENTS,  
GOVERNANCE AND LOCAL ECONOMIC  
DEVELOPMENT**

## 2.1. Introduction

Informal settlements are officially unplanned residential areas made up of low-income dwellings. They have been recognised to play an important role of providing shelter to the poor in many cities. These settlements are known by many names, *viz.*, *favela* (Brazil), *barridas* (Peru), *kachi abadis* (Pakistan), *kampong* (Indonesia) and *shanty towns* (in English-speaking Africa) or generally ‘slums’ (UN-Habitat, 2003; UNFPA, 2007, p. 10). Fekade (2000, p. 129) calls informal settlements ‘self-planned settlements’. Referring to the settlements as a ‘self-planned’ is not as stigmatising as calling them ‘slums’ as I will explain below. In South Africa, these settlements defy planned segregation that was promoted by the former apartheid government and they are an outcome of the poor households’ re-planning or self-planning of the city through informal means (Huchzermeyer, 2013).

As outlined in Chapter 1, was aimed at gaining an understanding of the intersection between climate change and informal settlements. It is important to understand the various dimensions of informal settlements in order to gain insight into the climate change and informal settlements intersection. To present the relevant understanding of this intersection, this chapter reviews the literature defining informal settlements and how they are characterised within the global and South African contexts. It also provides an understanding of the nature of informal settlements, as well as their advantages and disadvantages within an urban context. The chapter goes further to provide the conceptual background of the study context, focusing on the two selected informal settlements in the City of Johannesburg.

Further, this chapter provides a review of literature on policy responses to informal settlements and their implications for human life, both internationally and in South Africa. It goes further to illuminate how households in informal settlements mobilise

social capital to deal with their socio-economic conditions. The chapter also covers the socio-economic circumstances of informal settlement households that are shaped by the existing conditions of governance and Local Economic Development (LED).

## **2.2. Towards an understanding of informal settlements**

The term informal settlement has different definitions, ranging from the physical to the social context. It is impossible to define informal settlements using ‘one single parameter’ based on the fact that they are a ‘relative concept’ and they change very fast (UN-Habitat, 2003). Thus, Barry and Rüter (2005, p. 45) define informal settlements as ‘complex, dynamic social systems that, in many instances, experience continual change’. A common component of most definitions of informal settlements is the notion that these settlements mainly constitute low-income communities who have settled on land illegally (UN-Habitat, 2003). The legally unrecognised land tenure system can be the result of a variety of informal land delivery processes (UN-Habitat, 2003). Housing structures generally do not conform to the building standards and codes and are produced through a range of local building material, indigenous technology, skills and designs (Fekade, 2000, p. 138).

The words that are commonly used to label these self-directed settlements are ‘illegal’, ‘squattling’, ‘unregulated’ and ‘uncontrolled’ and these terms are associated with the often negative attributes associated with these areas (Fekade, 2000, p. 129). Rather, informal settlements are described as ‘neglected parts of cities where housing and living conditions are appallingly poor’ (UN-Habitat, 2003, p. 10). The United Nations Expert Meeting held in Nairobi in 2002 defined a ‘slum’ as a place with inadequate access to safe water, inadequate access to sanitation and other infrastructure, poor structural quality housing, overcrowding and insecure residential status (UN-Habitat, 2003, p. 12). The Vienna Declaration (VD) on informal settlements in South Eastern Europe defines informal settlements as ‘human

settlements, which for a variety of reasons do not meet the requirements for legal recognition (and have been constructed without respecting formal procedures of legal ownership, transfer of ownership, as well as construction and urban planning regulations), exist in their respective countries and hamper economic development' (VD, 2004, p. 1). UN-Habitat (2008, p. 104) describes 'informal housing' as housing 'that does not conform to the laws and regulatory frameworks set up in the City in which it occurs.' Apart from focusing on the deficiencies, the above definitions also mainly focus on the physical and legal status of the settlement, while shying away from the social intricacies of informal settlements.

In deciding on a definition of informal settlements for this thesis, I attempt to combine the key deficiencies with the opportunities these settlements offer. The absence of official authorisation for the occupation is important, as it determines insecurity of tenure and therefore restricts the kinds of investments or improvements that are made, both by residents and by the authorities. Informal settlements are areas 'where people have settled against the wishes of the landowner' and they generally infringe 'on the land use control of the area' (Fourie, 1998, p. 57). These settlements can also occur in a situation where people have settled in an area with the permission of the landowner, without any approval from the local authority (*ibid.*).

It is relevant to note that in South Africa, there is confusion on the definition of informal settlements. In the City of Johannesburg in particular, informal settlements include transit camps, some occupied buildings and formal houses with no transfer of title deeds (Huchzermeyer, Karam, & Maina, 2014). This makes it more important to clearly articulate a definition for the purposes of this study. This study adopted the recent definition by the National Upgrading Support Programme (NUSP) of the National Department of Human Settlements in South Africa. NUSP refers to informal settlements as 'illegal' and unplanned occupation of land, in urban or peri-urban areas with unhealthy population densities and on unsuitable land (NUSP, undated). In this study, I avoid the terms 'slum' and 'squatter camp' because of the negative

connotations associated with them (Huchzermeyer, 2011; Kornienko, 2013; Sverdlik, 2011).

Informal settlements offer an array of socio-economic opportunities to those who the state cannot provide for (Misselhorn, 2008, p. 10) or who are unable to provide for themselves within the formal market. Economically, these settlements provide low-cost labour for private and public production of goods and services (*ibid.*). Therefore, these areas can be viewed as places where people ‘can access the urban environment at extremely low financial cost and put together various livelihood strategies’ (Misselhorn, 2008, p. 5). Informal settlements also provide low-cost services such as shared water taps and toilets, and low-cost/no-cost housing for the rapidly increasing low-income urban residents, and they also offer an alternative to government involvement in the housing sector (Boudreaux, 2008). Thus, informal settlements must also be viewed as a creative approach through which the impoverished respond to the inability of the state to meet their basic needs, thereby filling an important gap (Roy, 2005). In order for the houses to be low-cost, in these areas, smaller spaces must be used, combined with crowding and tenure insecurity (*ibid.*). Housing construction in informal settlements is flexible, simpler and requires less labour (*ibid.*). Informal settlements also offer the space where the poor can live a family life (Makhulu, 2010). They are also places for the emergence of home-based enterprises that are propelled by low rental (*ibid.*). Informal settlements provide networks of social support for newcomers into the city (Guillaume & Houssay-Holzschuch, 2002). People also exercise a choice as to where they want to stay (*ibid.*). Informal settlements are places where despite the difficulties solidarity and cultural movements (*i.e.* origin of dance and musical movements) emerge and in addition they are incubators for upward economic and social mobility (UN-Habitat, 2003). It is on these positive attributes of informal settlements, balanced by real challenges and inadequacies and notwithstanding a wide diversity of conditions within and across informal settlements, that this thesis builds its understanding of adaptive capacity.

### **2.3. Government reactions to informal settlements: A brief international perspective**

Any engagement with informal settlements needs to be preceded by an attempt to understand their types and characterisation, which vary considerably internationally. There are various types of informal settlements shaped by places where they are located, sizes and the surrounding environment. The location and surrounding environments play a role in the exposure and the nature of responses of informal settlements to climate change (Adeniji & Ogundiji, 2009). The UN-Habitat (2003) lists the following types of informal settlements, based on their location and size:

- **Central or inner city ‘slums’:** these settlements normally emerge in parts of the city that have deteriorated, with the owners moving out to other places;
- **Scattered islands:** this is a combination of informal settlements that are found surrounded by formal houses and other types of land-uses;
- **Peripheral settlements:** these are settlements found on the fringes of an urban area facing challenges that include commuting to the urban centres and other amenities;
- **Large settlements:** These are large informal settlements that are in some instances equivalent to cities and examples include Dharavi (India) and Orangi (Pakistan);
- **Medium-sized informal settlements:** These are settlements that commonly develop on vacant land because urban planners deemed the land unsuitable for development purposes, examples are steep slopes, marshes and swamps; and
- **Small informal settlements:** These are scattered within the urban landscape with very few dwellings sometimes located near urban centres or built on pavements.

For a study on the intersection between informal settlements and climate change, an understanding of local government responses to informal settlements is important. This determines how households shape their lives and access different sources of livelihoods, and this is key for responding to change related to climate change. Governments have responded to the challenge of informality through an array of policies. One of the approaches globally has been the upgrading of informal settlements (Del Mistro & Hensher, 2009; Misselhorn, 2008). On the other context, governments have responded to the challenge of informal settlements through elimination/eviction, for instance Zimbabwe’s Operation Murambatsvina, as a means to restoring order (Potts, 2009). The ranges of responses to informal settlements are outlined in Table 2.1.

Table 2.1: Types of global responses to the informal settlement challenge

Response	Description
Negligent	This approach is based on the view that urban planners consider informal settlements to be illegal and therefore they require no state attention. In this context, informal settlements may be intentionally left out of city land use maps but rather shown as vacant areas.
Repressive	Removing informal settlements despite resistance, with negative impacts on people’s lives.
Deterministic	Prescribing ‘good solutions’ to the poor’s problems and without appropriate consideration of peoples’ socio-economic situation and livelihoods.
Self-help and upgrading/Transforming	This approach focuses on the provision of basic services, access to land, secure tenure and credit.
Enabling policies/Transforming	This approach involves community organisation and mobilisation with the intention of promoting local action that may take place with limited or no state

	intervention.
Tolerant/Ambivalent	This is based on a cost-benefit analysis based on the potential for votes before the election process.
Transitional	This involves providing temporary occupational rights to transit camps or informal settlements.
Amnesty	This provides immunity to eviction through permanent or temporary occupation rights based on a timeframe where there is uninterrupted occupation.
Resettlement/Transforming	This involves moving informal settlements residents to other places within the city or urban area.
Participatory and holistic informal settlement improvement / Transforming	Residents drive this approach and the government plays the role of a facilitator and provider. The residents get involved in developing their area. This has been done in places like Dakar (Senegal) and Orangi (Pakistan).

Source: Huchzermeyer, Karam, Stemela, Siliga, and Frazenburg (2006); UN-Habitat (2003).

For South Africa, informal settlements are acknowledged to be a by-product of former state policies and the response to informal settlements has been generally one of control and elimination (Selmeczi, 2011). The government's intention has been to replace these settlements with formal and neat estates called RDP Housing (Huchzermeyer, 2011). The inclination towards eradication of informal settlements has led to a situation where the poor have no option but to fight for quality urban life (Selmeczi, 2011). In some instances this approach has been responded to by what is termed 'disciplinary spatial practices originally characteristic of the policing order' that is reinforced through continuous surveillance of spatial order dissent (*ibid.*:65). Continuous surveillance of spatial order in this situation refers to the monitoring of any emergence of new informal settlements and ensuring that they are not allowed to get established. This in some instances, in South Africa, has involved forcible removal of the poor occupying land illegally (Makhulu, 2010).



Informal settlements must not be viewed as a land problem issue but rather as a challenge calling for a right to the city rather than a right to property (Roy, 2005). The right to the city has become a bone of contention between residents of informal settlements and city planners in many parts of the world (Selmeczi, 2011). This struggle is exacerbated by the limited capacity of city planners to timeously respond to the needs of the poor (Kulabako, Nalubenga, Wozzi, & Thunvik, 2010). Informal settlements are a sign of unequal land ownership, exclusion and skewed wealth distribution in the urban landscape (Kulabako *et al.*, 2010; Roy, 2005; Selmeczi, 2011). These settlements need to be viewed as product of the state planning (Roy, 2005). So in this context, planning produces both the ‘unplanned and unplannable’ (*ibid.*:156).

#### **2.4. Informal settlements, migration and climate change**

Informal settlements, as per the above review, are places prone to change by their very nature. Regional climate change has an implication for migration patterns as well as processes of impoverishment, both of which may drive more households into urban informal settlements as well as lead to the creation of new informal settlements when the exposure of existing ones to climate extremes (*e.g.*, floods) makes them untenable. Therefore, processes of urban population change, as influenced by migration and climate change, are relevant for this thesis.

Population mobility and natural population increase are two important factors that shape urbanisation, as well as the growth and diversification of informal settlements (Hope, 2009; Potts, 2009). Urban areas require different forms of labour which in turn play a major role in economic development (UN-Habitat, 2009). The movement of people to urban areas is influenced by the search for employment in addition to a myriad of pull and push factors (Roberts, 1989). Rural-urban migration, in particular,

plays an important role in urbanisation in sub-Saharan Africa (Barrios, Bertinelli, & Strobl, 2006). Of direct relevance to this thesis, rural-urban migration has been found to be fuelled by push factors that include changes in rainfall patterns (Afifi, Liwenga, & Kwezi, 2013). A reduction of rainfall in some areas has caused drought and shortage of water (*ibid.*). This in turn negatively affected agriculture and food security and pushed people to move to urban areas in search of opportunities (Piguet & De Guchteneire, 2011). Climate change is expected to lead to the reduction of agricultural productivity in Africa and inherently crop failures may play a role in the increase of the migration of people from rural to urban areas (Hope, 2009). Changes in water availability, sea level rise (*ibid.*) and decreasing rainfall (Kniveton, Smith, Black, & Schmidt-Verkerk, 2009) will also combine to play a role in the migration of people to urban areas and this may be compounded by political instability and wars (McGregor, 1994). In this context, it is considered a disadvantage that the African continent is home to many people who depend on natural resources for livelihoods as changes in rainfall may push these people from the rural areas to urban areas (*ibid.*).

Migration is ‘complex, multilevel in nature, difficult to determine, and not easily generalizable’ (Statistics South Africa, 2006, p. 10). Furthermore, migration is a result of ‘complex behavioural decisions’ (Kniveton et al., 2009, p. 49), therefore climate variations would interact with a host of other factors such as changing of value systems among the youth in leading to a rural household’s or individuals’ decision to migrate to a city. Thus, migration is a result of ‘several converging factors, and that environmental stress is always mixed with other causes, which may include economic constraints and opportunities, social networks, political context, *etc*’ (Piguet & De Guchteneire, 2011, p. 13).

It is expected that climate change will have a major impact on migration, quality of life and development in urban areas, especially in informal settlements (Hope, 2009). However, ‘climate change, on its own, does not directly displace people or cause them to move but it produces environmental effects and exacerbates current

vulnerabilities that make it difficult for people to survive where they are leading to movements of populations' (Laczko & Aghazarm, 2009, p. 14). Migration can rarely be directly 'attributed to climate change' (Piguet & De Guchteneire, 2011, p. 13). Involuntary migration and resettlement can be attributed to stressors emanating from climate change (Warner, 2010).

Urbanisation in Africa is also to a certain extent caused by the urban bias in development leading to growth of various urban centres (Hope, 2009). Due to rural households' need for economic improvement, urban economic growth that provides some opportunities such as employment and income acts as an attractor. The concentration of economic opportunities in urban areas act as the complementary pull factor that affects migration and consequently the increase in urbanisation (Sridhar, Reddy, & Srinath, 2013). In urban areas the negative impacts of climate change such as flooding, rainfall and extreme weather are 'compounded by many factors including poverty, weak service delivery capacity, diseases, and high population density' (Hope, 2009, p. 649). Sub-Saharan African countries also have the highest levels of urban poverty, with the majority of the poor staying in informal settlements where they tend to overuse limited and much needed local resources such as land and water (*ibid.*).

Recent inter-census data shows that some sub-Saharan countries are urbanising slowly (Potts, 2009). Rates of urbanisation have decreased in Mali, Ivory Coast and Zambia, and it has slowed in Mozambique, Zimbabwe, Mauritania, Niger, Senegal and Burkina Faso (*ibid.*). In sub-Saharan Africa's urbanisation, 'net in-migration to towns has slowed very significantly' (*ibid.*:254). This is attributed to factors such as 'increased circular migration which has reduced the contribution of in-migration to urban growth' (*ibid.*: 253). The implication of this in informal settlements is that circular migration is likely to lead households to a situation where they are less likely to settle permanently. This means that they are less committed to their places because

they foresee the government upgrading them. All this might have implications for household coping and adaptive capacity in relation to climate change.

Population increase and city-ward migration have led to large numbers of poor people in cities and due to the unpreparedness of cities, often through unequal patterns of development, the end result has been the concentration of informal settlement communities, often in precarious areas. In South African cities the increasing migration of people into certain informal settlements has led to increased overcrowding and consequently also increases the vulnerability of such communities to risks related to floods, fires and communicable diseases (Vearey, Palmay, Thomas, Nunez, & Drimie, 2010) (I return to this theme in more detail later in the chapter as it is central to understanding the socio-economic conditions in informal settlements in South Africa). As in other countries, this tendency places a localised strain on limited resources such as water (UNFPA, 2007), particularly where access to urban services in informal settlements is already virtually non-existent (Hope, 2009).

Since 1994 in South Africa there has been some notable in-migration of people into already dense settlements in peri-urban areas (including into informal settlements) (Atkinson & Marais, 2006), with the largest concentration of such settlements in the province of Gauteng. Consequently, this combined with other factors has made some contribution to the significant rate of urbanisation in Gauteng (SSA, 2006). The Gauteng City Region Quality of Life Survey found that 31% of the City of Johannesburg residents are internal migrants (from parts of South Africa), while international migrants constitute 9% (GCRO, 2012). South Africa's 'internal migrants are significantly more likely to reside in the urban informal settlements and cross-border migrants are significantly more likely to reside in the inner city' (Vearey et al., 2010, p. 697). This means that informal settlements act as a gateway to urban life mainly for local migrants, and they play an important role within the urban landscape.

## **2.5. A brief history of the evolution and conditions of South African informal settlements**

In South Africa, apartheid planning and policies led to the segregation of so-called 'races' or 'population groups' groups labelled 'Whites', 'Coloureds', 'Blacks' and 'Indians'. The latter three were located in less desirable urban areas (often exposed to adverse weather, for instance extreme winds). This produced marginalisation and inequality in contrast to areas secured for those labelled 'Whites' who enjoyed privileged lives in well-serviced and environmentally pleasing areas of the city (Smith, 2003). Apartheid discrimination was socially unjust in many dimensions. Two important dimensions which have led to the perpetuation of poverty are the dispossession and deprivation of people from ownership of housing and land, and an inferior quality of education (Khoza, 2007). Apartheid era spatial controls broke down from the late 1980s onwards. However, '[t]he extreme inequality evident in South Africa means [sometimes] one sees destitution, hunger and overcrowding side-by-side with affluence' (Woolard, 2002, p. 1) and this is the case in Msawawa. Inherently, the destitution in the peripheral areas is portrayed by the persistent poverty and economic marginalisation (Arnall, Furtado, Ghazoul, & De Swardt, 2004).

Poverty in Johannesburg's urban fringes is further exacerbated by health challenges. Some of the informal settlements dwellers 'suffer disproportionately from ill-health' (Sverdlik, 2011, p. 123). The health challenges related to climate change were identified by Tabi (2013) in a study on climate variability in Ekanini (Khayelitsha, Cape Town) as cold/flu, lung problems (related to burning things such as paraffin in winter), blood pressure, tuberculosis (TB) and others. The health challenges in informal settlements in the City of Johannesburg are linked to a complexity of factors that interact, such as overcrowding, lack of infrastructure, lack of sanitation, poor

housing quality, limited refuse collection and minimal access to health care facilities (Shortt & Hammett, 2013; UN-Habitat, 2003, 2010; Vearey, 2012). Indoor air pollution is another challenge related to the use of wood and charcoal for lighting, heating and cooking, leading to respiratory problems such as asthma in South Africa's informal settlements (Muller, Diab, Binedell, & Hounscome, 2003; Shortt & Hammett, 2013). The health challenges faced by informal settlement residents include diseases such as diabetes, diarrhoea, acute respiratory infections, high blood pressure, low blood pressure, substance abuse, HIV and AIDS (Richards, O'Leary, & Mutsonziwa, 2007; Sverdlik, 2011; UN-Habitat, 2003, 2008; Vearey et al., 2010).

Disability and diseases in informal settlements also impact on how households access any available opportunities. Health plays an important role on household quality of life, capabilities, dignity and productivity (Wisner, 2003). Disability, ill-health and death have economic costs that are incurred by the household (*ibid.*). In particular, diseases such as HIV&AIDS have affected millions in southern Africa and South Africa in particular, leading to an increase in orphans, negative impacts on labour and loss of skilled people, all affecting the vulnerability of households (Vincent, 2007b). Notably, it has been found that in households affected by HIV&AIDS the monthly income decreases by 66 to 80% (Barnett, 2002; Vincent, 2007b). It has also been found that HIV&AIDS impacts negatively on social capital (discussed later in this chapter) and it can reduce coping opportunities as well as increase household vulnerability (Vincent, 2007b). Coping and vulnerability are discussed in detail in Chapter 3.

The right of access to healthcare is enshrined in the South African Constitution (Section 27(1)(a)). This is alongside the right to food, water, social security, shelter (only for children), housing (a qualified right depending on the state's available resources) healthy environment, land access and security of tenure. The realisation of these rights by households in informal settlements is difficult (Khoza, 2007; RSA, 1996). Despite the fact that the above rights are enshrined in the Constitution, they

remain intangible for households in informal settlements. This is attributed to the fact that it has been a challenge to address socio-economic issues such as poverty, unemployment, housing, crime, literacy and income in South Africa due to factors that include limited resources (Everatt, Smith, Jennings, & Solanki, 2008).

The South African government has responded to informal settlements through various policies that include low-cost housing developments for the poor in all the provinces. Kornienko (forthcoming, p. 4) noted that the wait by households for low-cost housing has had a negative impact on ‘self-fashioning’ that is manifested in the consolidation of the living space. The government had a noble goal of eradicating informal settlements by 2014 (Del Mistro & Hensher, 2009), initially to be achieved through land and planning reforms, but later through repressive means such as evictions (Huchzermeyer, 2010). The idea of ‘doing away with informal settlements’ (*ibid.*:138) has, however, become an elusive dream that is made difficult by the complexities of engaging with informal settlements which have been co-produced by the state over the years. Some of the challenges revolve around the slow process of allocating freehold titles, illegal sales of state subsidised houses by the poor, administrative limitations (*i.e.*, skills shortage, corruption, complex regulatory framework, *etc.*), and limited state resources (Del Mistro & Hensher, 2009). The policy of providing low-cost housing to the poor and in particular to those living in informal settlements (as a means of doing away with these settlements) has led to the construction of about three million houses since 1994 (Zuma, 2013). However, this policy has been blamed for perpetuating the location of the poor in dysfunctional and detached peripheral areas with limited economic activities (Huchzermeyer, 2003). This process, which involves relocation and the removal of informal structures and in some cases entire informal settlements, weakens and destroys livelihoods and social networks (Del Mistro & Hensher, 2009). More recently, the South African response to addressing the challenge of informal settlements has come to include upgrading (*in situ*) with limited disruption of people’s lives, introduced into policy in 2004 as the

Upgrading of Informal Settlements Programme (Del Mistro & Hensher, 2009). This is funded through the National Housing Subsidy System (*ibid.*). However, uptake has been slow and the dominant official interpretation of ‘*in situ*’ upgrading still involves destruction and replacement of the informal settlement rather than its improvement even though the Upgrading of Informal Settlements Programme specifically cautions against this norm (Huchzermeyer, 2011).

The introduction of the upgrading of informal settlements programme went hand in hand with government attempts to prevent new informal settlements from forming. Some municipalities sought to achieve this through the help of contracted security companies (Huchzermeyer, 2011). In most municipalities, the majority of informal settlements remain earmarked for relocation based on the fact that they are located on land that is deemed not suitable for housing purposes. This is despite the fact that the Upgrading of Informal Settlement Programme provides for land rehabilitation under the premise that informal settlements by their very nature locate on marginal and often risk-prone land (Huchzermeyer, 2011). In the relocation drive, some residents of informal settlements have been relocated to places termed ‘temporary’ relocation areas (*ibid.*). In some instances they have remained in these ‘temporary’ arrangements for over a decade with no permanent solution in sight. Examples include the Diepsloot Reception Area in the City of Johannesburg, with relocation from Alexandra in the years 2000 and 2001 (*ibid.*).

Poverty combined with other challenges discussed above have to an extent some bearing on this study because they affect households and their ability to respond to climate change. As pointed out, poverty and challenges such as diseases combine to make life in informal settlements such as Msawawa and Freedom Charter Square complicated (Sverdlik, 2011), although this does not necessarily mean that poverty means exposure to climate change (IPCC, 2014a). Notably, currently there is no upgrading taking place in either Msawawa or Freedom Charter Square. This means



that the prevailing conditions (I discuss this in detail in Chapter 4) of these settlements are likely to remain for some time.

## **2.6. Informal settlements and social capital**

Social capital is a term that bridges the divide between sociology and economics and has been applied in a variety of disciplines including sociology, business and others (Svendsen & Svendsen, 2004). Social capital is characterised as ‘features of social organisation, such as trust, norms and networks, that can improve the efficiency of society by facilitating coordinated actions’ (Putnam, 1993, p. 167). Furthermore, it can also be viewed as ‘the by-product of social interactions that are embedded in and accessed via formal and informal social relationships with individuals, communities and institutions’ (Hawkins & Mauer, 2012, p. 356). The mentioned definitions emphasise the fact that social capital has to do with people working together in networks (collective action) for accessing resources. Social capital must be viewed as a set of social relationships, a type of resource and asset (Rodrigues & Child, 2012). In some instances, the existence of social capital could lead to situations where remittances flow between individuals and households to help deal with challenges that may arise (Wisner, 2003). There are different types and advantages of social capital that I briefly review in the next section.

Social capital is a key resource that plays a pivotal role in the survival of households in places where resources are scarce, such as informal settlements (Blaikie et al., 1994; Wisner, 2003). It is also a resource that households could draw on when they are exposed to climate change (Adger, 2003) and thus it is important for this study. Social capital could emerge as an outcome of community efforts with government support and in some instances this could be an outcome of community initiatives without any form of support (Adger, 2003). Households in informal settlements have been known to draw on social capital for their survival (UN-Habitat, 2003). As

already mentioned, South Africa's major cities have a significant population residing in informal settlements with limited resources (Habib & Maharaj, 2011). This contributed to urban poverty that in turn is attributed to low capital accumulation, low productivity, low savings and low average income (*ibid.*). The urban inequality and challenges experienced by residents of informal settlements related to access to services and economic opportunities have made individuals and households rely on their social capital (Williamson, Hesselin, & Johnston, 2010).

### **2.6.1. Types of social capital and its advantages**

Social capital is an important resource that is considered to be non-material and invisible because it exists and is driven by human relations (Svendsen & Svendsen, 2004). People build and spend these resources by contributing and cashing in on reciprocal networks. Further, the relationships that people have, and which are represented as 'social capital', are of intrinsic and inherent value to them and society (Anderson, 2010). These relationships are not enforced upon people and are therefore voluntary. Thus social capital rests on a foundation of generalised or specific trust and is considered a lubricator that links people together in a voluntary and trusting way (Devadason, 2011; Hawkins & Mauer, 2012; Rostila, 2010). The evolution of this trust and common rules is important, as is the reciprocity that forms part of such trust (Adger, 2003). The networks of trust and reciprocity are created by either individuals (for individual benefit) or communities (for communal benefits) (Devadason, 2011; Hawkins & Mauer, 2012).

Bonding, bridging and linking are the three types of social capital that all have their contributions that can lead people to different results in life (see Table 2.2. for how the relative strength of social ties is transformed into social capital) (Devadason, 2011). Bonding capital develops through exchanges of members of a network or group who view themselves as having similarities (Hawkins & Mauer, 2012; Rostila,

2010). Bonding refers to ties between friends and family members (Zhan, Anderson, & Zhan, 2011). Bridging capital takes place in relationships between groups and people who are considered dissimilar in terms of socio-economic status, age, education and ethnicity, and this is primarily outside of families (Hawkins & Mauer, 2012; Rostila, 2010). This form of capital simply represents the connections between groups (Lancee, 2012) and this is important in enhancing individual or household adaptive capacity (see detailed discussion on adaptive capacity in Chapter 3) (Adger, 2003). Linking capital results from exchanges arising from relationships built by communities and individuals with people and institutions who have some power over them (*e.g.*, access to employment, services) (Hawkins & Mauer, 2012; Rostila, 2010). The value of social capital to each individual member depends on the characteristics of the network, social ties strength and assets of network members (political, environmental, social and economic) (Hawkins & Mauer, 2012).

Table 2.2: Generating social capital from the relative strength of social ties

<b>Social network</b>	<b>Social support</b>	<b>Social Capital</b>
Heterogeneous dense	Strong Ties	Bonding
Heterogeneous moderately dense	Moderate	Bridging
Heterogeneous dense	Weak Ties	Linking

Source: (Hawkins & Mauer, 2012).

Social capital has various advantages that include sharing resources, being able to count on family and neighbours for support and being able to use trust to save transaction costs as deals can sometimes be concluded with limited monitoring or contractual agreements (Svendsen & Svendsen, 2004). This resource is developed through interactions that generate social norms and behaviours that are predictable (Devadason, 2011). A good example is the micro credit system with its success mainly dependent on social capital (the motivation for repayment is that other

members will receive a loan) (*ibid.*). This is one example on why social capital could be considered the key element related to climate change that has the potential to improve household adaptive capacity (Adger, 2003). Notably, it is not easy to determine in advance the social capital needed to achieve a particular result (Blair & Carroll, 2009).

### **2.6.2. The limitations of social capital**

Despite the strong interest in social capital, it is still viewed by many scholars with scepticism (Adger, 2003). Some caution has been expressed against only viewing social capital as positive because in some instances it does involve behaviours that are socially unacceptable such as gangsterism (Svendsen & Svendsen, 2004). The concept of social capital has also been regarded by some scholars as controversial based on the fact that it is conceptually vague and difficult to operationalise (Rostila, 2010). Some of the criticism of the term was based on the notion that it has been overstretched and used to cover numerous relationships, making it synonymous with everything that is socially good (Rostila, 2010). Chalupnick (2010, p. 1231) warns that if a 'concept starts to explain too much, it might not really explain anything'. This has been the challenge in the application of the term 'social capital' to mean so many things that it has become 'blurred' and 'fuzzy' (*ibid.*).

The socio-economic circumstances in which people find themselves may have an impact on the nature of social capital that could be built and accessed (Hawkins & Mauer, 2012). As an example, when a person belongs to a low-resourced network, assets accrued by individual members will automatically get subsumed by members inclusively (Hawkins & Mauer, 2012). In this situation, resource demand is high and individual members start to face challenges in accessing network resources, which limit their ability to connect with other groups (*ibid.*). Individual social capital helps

the individual to access resources from others to meet personal goals while the collective goal may be the opposite (*ibid.*). Furthermore, reciprocity and high levels of trust in networks can be both helpful and hurtful (Hawkins & Mauer, 2012). The challenge is in some situations where isolated groups such as gangs monopolise cooperative networks with exclusive capital as the end product (Svendsen & Svendsen, 2004). In this context social capital may obstruct macro level economic growth and negatively affect quality of life. This type of social capital used by groups such as gangs creates distrust, lack of communication, limited citizen cooperation, disintegration of society and in extreme cases it leads to violence (Anderson, 2010; Svendsen & Svendsen, 2004).

Trust and membership are some of the key elements of social capital that are also related to governance (this concept is unpacked below). They have also been identified as some of the factors important in building the basis for governance (Eberle, 2003; Putnam, 1993). Therefore, social capital is in some way linked to governance because it often arises to fill the gap that exists due to exclusion from formal governance structures. Further, it has been found that ‘higher levels of social capital help to facilitate good governance’ (Eberle, 2003, p. ii). As noted, social capital is an important resource for households in informal settlements and it is critical for this thesis to examine its existence and role.

## **2.7. Towards an understanding of governance**

Governance is to an extent determined by society and the qualities of the members thereof (Eberle, 2003). This implies that governance is about relationships between stakeholders, and how different stakeholders have are able to influence (or constrained from influencing) policy, budgetary and managerial prioritisation and

decisions, and to what extent those who make decisions are held accountable (Devas, 2004; Haferburg & Huchzermeyer, 2015; Samaratunge & Pillay, 2011). This notion is contrary to the past understanding of the state as pre-eminent and unchallengeable in the exercise of power (Chhotray & Stoker, 2010). Therefore, governance is distinct from the government (state actors), as it is the engagement of different actors that include government, civil society and others in pursuit of some common goals (Kjaer, 2004). The UNDP (2007b, p. 1) defines governance as a:

‘system of values, policies and institutions by which a society manages its economic, political and social affairs through interactions within and among the state, civil society and private sector. It is the way a society organizes itself to make and implement decisions, achieving mutual understanding, agreement and action. It comprises the mechanisms and processes for citizens and groups to articulate their interests, mediate their differences and exercise their legal rights and obligations. It is the rules, institutions and practices that set limits and provide incentives for individuals, organizations and firms. Governance, including its social, political and economic dimensions, operates at every level of human enterprise, be it the household, village, municipality, nation, region or globe’.

Studies on governance have examined public and private actors, the role in participatory processes and the extent to which these have led the delivery of services to improve people’s quality of life (Beall, Crankshaw, & Parnell, 2002; Chhotray & Stoker, 2010; Samaratunge & Pillay, 2011). Additionally, governance refers to ‘the relationship between civil society and the state, between the rulers and the ruled, the government and the governed’ (McCarney and Stern, 2003:36). It is also about ‘rules of collective decision-making in settings where there are a plurality of actors or organisations and where no formal control system can dictate the terms of relationships between those actors and organisations’ (Chhotray & Stoker, 2010, p.

3). The relationships between the different actors are often not formalised and control over the process and its outcomes maybe uneven (Chhotray & Stoker, 2010).

### **2.7.1. Participatory Governance**

The current developmental local government approach in South Africa derives its strength from the recognition of linkages between service delivery, development and citizen participation (Mogale, 2003). Seen from a governance perspective, local government is part of a ‘relational interaction with other organized constituencies and interest groups’ (Beall *et al.*, 2002, p. 16). Social interaction is a process that relies on hegemonic influence, communication, signals and negotiation, and it is not managed through supervision and oversight (Chhotray & Stoker, 2010). In this context, the users and clients hold service providers accountable and this has the potential to increase service quality (*ibid.*). Understanding the nature of public participation in relation to the two case study informal settlements could help me understand the factors influencing household exposure and responses to climate change. On the other side, limited participation can lead to frustration, anger and service delivery protests primarily emanating from informal settlements (Pernegger, 2015), and also negatively affect household responses to climate change (Chhotray & Stoker, 2010). This is the reason why this study draws in this review on public participation.

Public participation is viewed as organised efforts aimed at increasing control of regulatory institutions and resources by movements and groups (Mogale, 2003). Participation in government processes is key in enabling households to access information, knowledge and resources that could help them in dealing with exposure to climate change (Adger, 2003). This process can also help in improving social outcomes and providing an opportunity of ensuring that factional inputs are harmonised (Irvin & Stansbury, 2004). This is based on the fact that participation has the potential to ensure that the energy and untapped community resources are

mobilised (Frankish, Kwan, Ratner, Higgins, & Larsen, 2002) and the programmes being implemented are grounded on the preferences of communities (Irvin & Stansbury, 2004). Public participation is also based on the belief that the involvement of all stakeholders can help in arriving at cost effective decisions (Mogale, 2003) and improved relations within the community (Irvin & Stansbury, 2004). Furthermore, public participation is a process whereby the local residents participate in determining the parcelling of contracts, operation of programmes, sharing of information, formulating policies and goals, and allocating tax resources (Mohamed, 2006). Debating amongst various stakeholders has become a key part of governance and it promotes citizen participation and collective decision-making (Samaratunge & Pillay, 2011). The outcome of the debates and dialogues is improved understanding on the part of the administrators on different positions among communities. Thus, this can help inform planning and implementation (Irvin & Stansbury, 2004).

Despite all the good intentions of citizen participation, there are challenges that have been noted (Irvin & Stansbury, 2004). In particular, public participation in South Africa has been applied in a limited manner with patchy success results (Mogale, 2003), and it has also been viewed as a costly process (Sihlongonyane, 2015). In particular, informal settlement communities have not participated effectively in decision-making at a local level and this is attributed to a lack of recognition of their settlements and the lack of capacity to communicate (Mohamed, 2006). Other factors that inhibit participation of informal settlement communities include the negative attitude towards these settlement and limited effective local organisations that can represent them (*ibid.*). Furthermore, some scholars believe that public participation does not necessarily guarantee either satisfaction or influence of the process at hand (Frankish *et al.*, 2002). In some situations, public participation has remained ideological and fuzzy (Mogale, 2003). Public participation has at times degenerated into some ‘feel-good slogan coined to convince local audiences that local government has recognised the necessity of involving local people in development activities’ (*ibid.*:223). This is based on the fact that in some instances the process of



participation is manipulated, and on the unresponsive and remote nature of the elected representatives. In some instances, public participation processes are also just marketing exercises that help the administrators obtain approval on their decisions (Irvin & Stansbury, 2004). This type of public participation has no potential to enable households in informal settlements to respond to exposure to climate change. There are other challenges related to public participation and these include the fact that it is viewed by some as a costly process, in terms of time and financial resources to both the administrators and the public (Irvin & Stansbury, 2004). Interest in participation by the state actors may not be driven by the quest to ground programmes of community preferences, but rather the prospect of having a more cooperative public and gaining acceptance (*ibid.*). This ultimately becomes simply a process of indoctrinating the community with the viewpoints of the administrators. In some instances the process is aimed at reducing the probability of costly litigations against the state, perhaps by communities feeling left out of processes that affect their quality of life. Additionally, a lack of effective participatory mechanisms, imbalances in resource allocation, especially to communities in informal settlements, has globally combined to limit strategic responses to the challenge of informal settlements (UN-Habitat, 2003, p. 1) and climate change (Adeniji & Ogundiji, 2009).

### **2.7.2. Governance and government in South Africa and Johannesburg**

The South African Constitution allows for three spheres of government (national, provincial and local) and this helps in the decentralisation of power to the lower level to facilitate public participation and service delivery. In this context, local government became central in facilitating participation and service delivery through different actors. These actors in urban governance, amongst others, include civil society, community organisations, households, political organisations, NGOs, religious groups, businesses, government agencies and trade unions (Mogale, 2003). Further, local government also has to be developmental, accountable, participative,

redistributive and also mobilise resources (Habib & Kotze, 2003; Mogale, 2003). The decentralisation efforts have put local governments (*i.e.*, cities) at the centre of governance especially in relation to urban development and the eradication of poverty (Devas, 2001). Decentralisation of powers has also been viewed as more efficient and responsive to local needs as opposed to the remote centralisation of power (Kjaer, 2004).

South Africa has an array of policies and legislation that promote transparency and accountability in governance and these include the Constitution and the White Paper on the Transformation of the Public Service (1997) (Samaratunge & Pillay, 2011). In South Africa, public participation is also outlined as a key priority especially at a local government level through frameworks and policies that include the Integrated Development Plan (IDP) (Mohamed, 2006). The IDP process is a strategic approach aimed at fostering citizen participation (*ibid.*). Notably, the IDP process has been viewed by communities in Johannesburg as inadequate in promoting governance (Pernegger, 2015).

During the first years of democracy (1994-1999), the South African government was viewed to have had relatively good working relations with civic actors (Ballard, Habib, & Valodia, 2006). This good working relationship is viewed to have ended by the time of the second democratic elections in 1999 (*ibid.*). The social struggles between government and civic organisations started to emerge against service delivery and government policies that include the Growth Employment and Redistribution (GEAR) (*ibid.*). These social struggles also advocated for more transparency and participation at a local level (*ibid.*). Other governance challenges that led to these struggles include the emergence of the state's focus on urban competitiveness and urban entrepreneurship (Huchzermeyer, 2011). This has led cities such as Johannesburg to adopt a governance model that is based to an extent on private sector principles. This approach has been viewed to be ineffective because it serves the interests of the middle class and it 'excludes and displaces the poor'

(*ibid.*:50). In Johannesburg this displacement is portrayed by the visible peripheral informal settlements that continue to grow while the city has also been unable to meet the ever increasing demand for housing these communities (Murray, 2008).

The influx of people into Johannesburg has also continued in an era of deindustrialisation, contributing to the expansion of informal settlements, environmental degradation and unhealthy living conditions (Murray, 2008). To an extent, informal settlements have also become a growing ‘embarrassment’ to the City of Johannesburg (Huchzermeyer, 2011). The continuation of this attitude in the City has been attributed to challenges that include land prices and lack of capacity (Murray, 2008). As already mentioned, informal settlements are a by-product of government policies over many decades and their existence and character continue to be shaped by them (UN-Habitat, 2003). One component of this study is interested in the impact of governance on household responses to climate change. Governance codetermines levels of development and household preparedness for extreme weather to climate change and social changes such as increased city-ward migration and related informal settlement growth and densification (*ibid.*). The other challenge is the stagnant private sector investment in residential dwellings in low-income settlements (*ibid.*).

The City of Johannesburg has responded to the challenge of informal settlements through various means that include the provision of subsidised formal housing to those who qualified as a way of providing a safety net (Murray, 2008, 2009). Further, the city has also sometimes responded negatively to this growth, either through relocations or replacement of informal settlements with formal housing mostly and this also led to the displacement of a larger number of residents (Huchzermeyer, 2011; Murray, 2008), which primarily manifests itself in new informal settlements or expansion/densification of existing informal settlements and the supply of backyard rental stock. The negative approach was also fuelled by the adopted elusive strategy to eradicate informal settlements by 2014 (*ibid.*). Relocations and replacement of

informal settlements have been criticised as ineffective because they address the symptoms and not the problem (*ibid.*). The focus on controlling the emergence of new informal settlements in Johannesburg has also led to tensions and legal contestation between the state and communities (Huchzermeyer, 2011; Murray, 2008). The ‘unfriendly’ approach from the cities towards informal settlements has also led to a situation where the government has not significantly provided interim interventions to help ease the living conditions in informal settlements (Huchzermeyer, 2011). This situation has been exacerbated by the focus on physical service delivery, thereby limiting and relegating ‘participatory mechanisms’ to the periphery (Oldfield, 2008, p. 488). This in turn has limited the effectiveness of the city to engage with the poor in addressing emerging collective challenges such as climate change as portrayed by the limited focus on informal settlements in the City of Johannesburg’s Climate Change Adaptation Plan. Therefore, there is a need for the government to adopt new approaches that are seasonally responsive, incremental, flexible, participatory and situationally responsive when dealing with informal settlements (Misselhorn, 2008) and the emerging challenges related to climate change.

The City of Johannesburg has made considerable progress in the provision of basic services and housing. However, at the same time the City has also been dealing with challenges related to its engagements with local communities for some years. In particular, one of the challenges has been the growing level of strife portrayed by protests emanating from communities residing in informal settlements (Kornienko, 2013; Pernegger, 2015), signalling some weaknesses in the prevailing nature of governance. Some of the protests had been attributed to the declining levels of participation and dissatisfaction related to access to services such as housing, electricity water and sanitation (Pernegger, 2015). Positively, the protests have somehow forced the City to create ways in which to facilitate the expression of dissatisfaction from local communities, and this included the formation of the Petitions Unit (*ibid.*). In particular, residents of informal settlements in the City of

Johannesburg have attributed the protests and weakening of governance on continued marginalisation and limited economic opportunities available to households in informal settlements (*ibid.*).

## **2.8. The role of Local Economic Development (LED) on quality of life in informal settlements**

LED is an approach that is focused in a defined local territory aimed at addressing challenges posed by socio-economic conditions (poverty and unemployment), opportunities and crises through economic decentralisation and participatory development (Nel, Binns, & Bek, 2009). Notably, unlike in the past in South Africa, the focus is not only on ensuring that the economy is growing, but also improving people's welfare. This is an economic development approach that helps establish a minimum standard of living for all the people and increases it over time, reducing inequality, while simultaneously promoting sustainable resource utilisation and production (Blakely & Leigh, 2010). LED is a development intervention that has the potential to enable households in informal settlements to access economic opportunities that could help in addressing both their exposure and responses to climate change. This makes LED a relevant concept to assess in this study.

LED is both a contested and an elusive term (Rogerson & Rogerson, 2010). It is defined as 'a territorial concept and part of local development or regional management, especially aiming to stimulate the local economy to grow, compete and create more jobs, in particular making better use of locally available resources' (Trah, 2004, p. 1). Therefore, the focus of LED is on a particular territory or region, taking advantage of available local resources that could be used to build an economy that provides for the needs of local communities. Further, LED is also defined as a 'participatory development process that encourages partnership arrangements

between the private and public stakeholders of a defined territory, enabling the joint design and implementation of a common development strategy, by making use of the local resources and competitive advantage in a global context, with the final objective of creating decent jobs and stimulating economic activity' (ILO, 2006, p. 2). The emphasis of the above definitions is on promoting socially equitable economic growth, local competitiveness and sustainable resource use.

LED as an approach is aimed at bringing together civil society, local government and the private sector (Rogerson & Rogerson, 2010). The key is to ensure that local communities are given the space to grow the local economy with the help of various stakeholders. Thus, LED focuses on ensuring that local development integrates social, economic and environmental issues through developing and implementing programmes that could provide opportunities and improve livelihoods (Rogerson & Rogerson, 2010). This approach relies on locally-based and custom-made solutions that are adapted to local dynamics (Rodriguez-Pose & Tijmstra, 2005), thereby addressing local aspirations and goals through using locally available resources. LED was primarily developed to unlock local economies, enable local communities to manage their resources and partner with the private sector for employment creation (Nel, 2001) and poverty alleviation (Rogerson, 2008). It also helps empower local communities and stimulate dialogue (Rogerson & Rogerson, 2010). LED also aims to support the improvement of quality of life, promoting collaboration and networks, providing a competitive environment for local business, facilitating education and workforce development (*ibid.*).

The South African LED approach was premised on four areas of strategic intervention outlined in the Framework, *viz.*:

- Improvement of service delivery, governance, market and public confidence in municipalities;

- Conducting planning that exploits municipalities' comparative advantage;
  - Promoting local business infrastructure development and enterprise support; and
  - Promoting community development programming that is responsive and sustainable.
- (DPLG, 2006).

South Africa has also been globally recognised for the so-called pro-poor LED, which became very prominent after the apartheid era (Rogerson, 2006). The National Framework for LED posits that it is aimed at creating an environment and platform for engaging stakeholders in the implementation of programmes and strategies (DPLG, 2006). The country is also noted for being the only country in sub-Saharan Africa with a relatively mature and broad LED approach (Rogerson & Rogerson, 2010). Pro-poor LED in South Africa is about:

‘The stimulation, support and enabling of local economies and local actors through a developmental process of participation to economically empower the poor to gain access and take advantage of economic opportunities and to increase a conducive environment for the poor to become self-reliant’ (Isaacs, 2006, p. 120).

Pro-poor LED has a strong community development focus with leanings towards the poor (Rodriguez-Pose & Tijmstra, 2005). Local government in South Africa has spearheaded the process of pro-poor local economic development. The government provided the policy framework and guidelines at a national and provincial level. LED is viewed by government as a response to the failures of markets in stimulating local economies, and addressing the fragmented approach from government that has failed to create a shared vision between social actors and the government (*ibid.*). It is also a process whereby local government engages in enhancing the economic viability of its communities (Rogerson & Rogerson, 2010). In South Africa, LED focuses on small business development, urban agriculture, public procurement systems, place

marketing, property development, investment facilitation, encouraging local business, and improving the local business investment climate, upgrading training and skills (*ibid.*).

Despite well-developed policies on LED in South Africa, results are mixed with 'isolated examples of successful LED in small towns/rural areas, and best illustrations of success are generally found in South Africa's largest cities' (Rogerson, 2008, p. 316) and not necessarily in informal settlements, which is the focus of this study. South Africa implemented pro-poor projects driven at a national level that focused on poverty alleviation and they were often unsuccessful before the development of a coherent policy framework (Rogerson & Rogerson, 2010). The limited success is attributed to a lack of funds and poor implementation (Rogerson, 2008). This implies that LED has made a limited contribution in dealing with poverty and unemployment (*ibid.*).

At a local level, the City of Johannesburg has made substantial efforts in the development and implementation of LED programmes, also with mixed results (Rodriguez-Pose & Tijmstra, 2005). The contributing challenges to the successful implementation of LED include a lack of local skills, internal constraints and limited resources (*ibid.*). LED Programmes in the City of Johannesburg are funded through government sources, international agencies and the private sector (CoJa, 2009). Recipients of the funds include Community-Based Organisations (CBOs), municipalities, Small, Medium and Micro Enterprises (SMMEs), cooperatives, individuals and non-profit organisations (NPOs) (*ibid.*). Funded areas include: township and CBD regeneration, culture and arts, SMME projects, training and infrastructure, and sports programmes (*ibid.*). The City also formulates and implements regional economic development plans to help steer product and competitive local economies. The plans outline projects and programmes for addressing poverty and unemployment at a regional level (CoJ, 2008). The regional



plans formulated by the City include areas that have informal settlements. However, the plans have made very limited noticeable impact on improving local economies in informal settlements (*ibid.*). These regional plans could play an important role in the local economies of informal settlements, creating access to economic opportunities that could help households deal with their exposure to climate change.

## **2.9. Conclusion**

Literature reviewed in this chapter shows that informal settlements will remain a part of urban areas for some time despite the various efforts that are being made by governments to improve or neglect them. This is due to the fact that informal settlements offer an array of opportunities to the poor that the state for various reasons cannot provide, such as access to urban areas (Misselhorn, 2008). These settlements will continue to encounter various challenges that include a lack of durable housing, access to healthcare and access to employment, and these will vary from one place to another depending on surrounding economic opportunities (Habitat, 2009).

Further, the South African government, and in particular the City of Johannesburg, are trying to address the challenge of informal settlements through service delivery and participatory governance (Habib & Maharaj, 2011). Governance needs to be more participatory in order to help improve people's quality of life. In the case of informal settlements literature points to the challenge of limited participation of communities in government processes and policy formulation in particular (Mohamed, 2006). This marginalisation in policy formulation processes has potential implications on how informal settlements households can cope with climate change.

The chapter also assesses the concept of social capital in relation to informal settlements. Social capital in informal settlements is key in enabling household access

to resources, shaping local economies and creating opportunities for achieving ends that cannot be attained without it (Blair & Carroll, 2009). The limitation of social capital is the fact that the success of members is determined by the amount of resources owned by the network to which households belong, which in cases of informal settlements could be limited (Hawkins & Mauer, 2012). This is further influenced by the surrounding political and socio-economic circumstances that shape the amount and type of resources that can be accessed (*ibid.*). However, social capital plays a central role in enabling vulnerable households in places such as informal settlements to respond to climate change (Adger, 2003). This literature review on social capital further points to the fact that this is a key resource that households in informal settlements draw from to address a variety of challenges that they encounter (UN-Habitat, 2003). This is a resource that also plays a significant role when addressing household exposure to change (Adger, 2003). Social capital plays a significant role in dealing with gaps emanating from the exclusion of informal settlements from the prevailing formal governance structures.

Public participation is important in developing responsive policies and programmes that could help address challenges faced by communities in places such as informal settlements (Irvin & Stansbury, 2004). In this study, I apply the concept of public participation to mean the meaningful involvement of all communities, including those that are vulnerable, and organisations in policy development and implementation. Public participation in South Africa is limited despite the available legislative frameworks discussed above (Mogale, 2003). This limitation in turn affects access to information that could help in some way to shape informal settlement households' response to climate change. Public participation platforms could help empower households with knowledge related to climate change and this has implications for how their capacity to respond to extreme weather events could be shaped.

LED also has the potential to enable household access to economic opportunities and this could also help in building adaptive capacity (COGTA, 2009; Nel & Rogerson,

2005). LED is a developmental approach that is being used at a local level to address the challenge of informal settlements through state-driven economical programmes such as the support to local enterprises. Further, it has been found that approaches such as LED are not providing optimum benefits due to the fact that there is very limited participation in their formulation and implementation (Rogerson, 2006) and this has implications for people's quality of life and their ability to respond to challenges such as exposure to extreme weather events. In the following chapter I review literature on climate change in order to understand related extreme weather events that have the potential to affect the quality of life for households in Msawawa and Freedom Charter.

### **3. CHAPTER THREE: VULNERABILITY, COPING, ADAPTATION AND ADAPTIVE CAPACITY**

### **3.1. Introduction**

The complex interplay of migration and urban growth covered in the previous chapter contributes to the growth of informal settlements. Informal settlements are in some instances located in marginal areas that expose them to the increased frequency and intensity of extreme weather events related to climate change, and this in turn calls for coping and adaptation strategies in order to address emanating adverse impacts. This chapter reviews the literature on vulnerability, coping, adaptation and adaptive capacity. Furthermore, the chapter provides a discussion on the definitions of vulnerability, already mentioned in Chapter 1. It goes on to discuss the types of vulnerability, schools of vulnerability assessment and urban vulnerability. On coping, the chapter provides the definitions and examples. The chapter then looks at adaptation, and in particular at definitions, types, examples and determinants. Furthermore, the chapter provides insight on community-based adaptation and examples thereof. It goes on to provide a discussion on the climate change policy environment in South Africa and within the City of Johannesburg, with a particular focus on the potential contributions in the existing policy framework to reducing vulnerability, and enhancing adaptive capacities of households in informal settlements. The discussion on adaptive capacity provides definitions, characteristics and assessment at a household level. The discussion on adaptive capacity precedes that of adaptation because the former is the main focus of the study. The chapter also explores linkages between the concepts of vulnerability, coping, adaptation and adaptive capacity.

### **3.2. Vulnerability**

Vulnerability is a term that is conceptualised and defined differently by the scientific community from different backgrounds, including the social and natural sciences (Adger, 2006; Füssel, 2005, 2007b; Gallopín, 2006). It is defined differently in the

biophysical and socio-economic approaches that I discuss in Section 3.2.1. This concept has been variously equated or related to exposure and sensitivity, coping, adaptation, fragility, risk, susceptibility, marginality (Füssel, 2005). The diversity of definitions in turn has been blamed for the confusion related to the term (Hinkel, 2011). Despite the development of methodologies, glossaries and conceptual frameworks for clarifying the term, confusion and lack of consensus around the term vulnerability still remain (Adger, 2006; Smit & Wandel, 2006). While some scholars believe that it ‘has become so vague and abused that it is in danger of losing its analytical value’ (Cannon, 2008, p. 351), this is attributed to the fact that vulnerability is a complex and dynamic condition that varies due to stimulus and it is also system and place specific (Smit & Wandel, 2006). In this context, it is important to acknowledge the fluidity and dynamism of the term ‘vulnerability’, while also clarifying the understanding that will be followed in this thesis. Given the variety of definitions, it is particularly important that I outline the one I am following in this thesis. As already stated in Chapter 1, in this study I apply the definition provided by the Intergovernmental Panel on Climate Change outlined in Chapter 1. The IPCC definition focuses on the issue of exposure (also already discussed in Chapter 1), sensitivity and adaptive capacity.

Vulnerability is an outcome of exposure to climate change-related hazards, a sensitive environment and low adaptive capacity. Exposure refers to ‘the presence of people, livestock, species or ecosystems, environmental functions, services, and resources, infrastructure, or economic, social, or cultural assets in places and settings that could be adversely affected’ (IPCC, 2014a, p. 5). Sensitivity refers to ‘the degree to which a system or species is affected, either adversely or beneficially, by climate variability or change’ (IPCC, 2008, p. 86). Households in places such as informal settlements may be exposed to climate change hazards but if their adaptive capacity is high, their vulnerability will be low.

As mentioned above, the term vulnerability is applicable to both the social or socio-economic and biophysical contexts (Gallopín, 2006). Part of the reason for the varying definitions of vulnerability is the various schools of thought that have given rise to the term. These originate from two broad contexts – the biophysical and socio-economic approaches (Gallopín, 2006). The two types of vulnerability are discussed below.

### **3.2.1. Biophysical and social vulnerability**

Biophysical vulnerability is classified in the risk-hazard approaches that evolved from literature on natural hazards found in the field of geography (Eakin & Luers, 2006a). Of primary concern of biophysical vulnerability is the ‘biophysical risk factors’ such as the ‘frequency of extreme events’ and potential losses for the exposed population (*ibid.*:369). Biophysical vulnerability is the ‘function of a hazard, exposure and sensitivity’ (Brooks, 2003) . In this situation, human vulnerability is seen as an outcome of a physical hazard, its likelihood and frequency, and exposure and sensitivity of the human system (*ibid.*). The impacts of a hazard are an important focus, including the damage encountered as a consequence of the harm. However, the primary concern is the physical context. The focus on hazards in biophysical vulnerability is limited because this ‘approach underestimates the importance of socio-economic or political forces in shaping the production and distribution of risks and vulnerability’ (Pelling, 2011, p. 50).

Social vulnerability has evolved from the political economy/political ecology approaches which developed at a response to the ‘risk-hazard assessment of climate impacts and disasters’ (Eakin & Luers, 2006a, p. 370). In the social vulnerability approach, vulnerability is a condition or state of being and existing inequities in resource access and distribution moderate it (*ibid.*). Social vulnerability is defined as ‘the vulnerability experienced by people and their social, economic and political

systems' (Pelling, 2003, p. 5). This is based on the notion that vulnerability exists in any system (Brooks, 2003). Therefore, vulnerability primarily has more to do with the internal characteristics of a system (*i.e.*, household) and its adaptive capacity (*ibid.*). The social vulnerability school of thought posits that people are central to the issue of vulnerability, and they are in some contexts the creators of their own or others' vulnerability through power relations that include the functioning of political and economic systems (Cannon, 2008). The root causes of vulnerability include limited access to power, resources, structures and ideologies (economic and political systems) (see Figure 3.2. on the progression of vulnerability) (Blaikie, Cannon, Davis, & Wisner, 2004). Thus, exposure to hazards is not the main challenge, but the complexity of the interaction of socio-economic and political processes (Blaikie et al., 2004; Bradley, 1997). These processes shape people's conditions to respond to, cope with and recover from hazards that they face (*ibid.*). The focus is on why particular populations are vulnerable, how they are vulnerable, and who is particularly vulnerable (Eakin & Luers, 2006a). Vulnerability is also about knowledge and perceptions (Hilhorst & Bankoff, 2004, p. 5). It is embedded in processes and complex social relations rather than individuals and or social groups (*ibid.*). Therefore, in order to address vulnerability the focus should be on individuals, households and communities. The focus must also be on the contribution of the politics and socio-economic conditions that shape their lives and decisions (Füssel, 2005) .

Productive capacity and endowments entitlements or assets play a role in household vulnerability to climate change (Pelling, 2003). The households' overall conditions determine its productive capacity and endowment entitlements that amongst others include land, labour, cattle, housing, social support, safety nets and others (*ibid.*). These entitlements shape the vulnerability and ability to adapt in a household. Inequality, access to food, poverty, marginalisation, access to insurance and housing are some of the factors that shape social vulnerability (Brooks, 2003; Pelling, 2003).



Notably, women-headed households in South Africa have been considered more vulnerable when compared to male-headed households (Budlender, 2003). The differences that have been noted are that women-headed households earn less income, are more affected by inequality, have lower resource entitlement and less access to economic opportunities (*ibid.*). See the following list (Table 3.1) for some indicators of vulnerability at various levels (Agrawal, 2008). Vulnerability indicators are helpful in the assessment of how households could be affected by climate change and identifying related adaptation options (*ibid.*). They also help in assessing progress related to how people are addressing vulnerability, and this makes decision-making easier (*ibid.*). They also show how non-climatic variables such as age, poverty and others shape household susceptibility to the increased frequency and severity of extreme weather events (*ibid.*).

Table 3.1: Indicators of vulnerability at various levels

<b>Household (variables)</b>	<b>Level Community (variables)</b>	<b>level National/regional level indicators</b>
Dependence on risky resources	Inequality	Literacy rate
Poverty	Poverty	Population with access to sanitation
Assets	Social entrepreneurship	Maternal mortality
Age distribution	Age compositions	Literacy ratio
Gender balance	Gender composition	Public participation
Institutional access	Institutional interconnections	Political rights
Skill set	Cultural factors	Life expectancy

Source: Adapted from Agrawal (2008).

Figure 3.1 below provides a conceptual view on the progression of vulnerability. It provides the root causes of vulnerability, which are social in nature. These include access to power, structures and resources. It also indicates that political and

economic systems play a role in household vulnerability. A combination of pressures such as a lack of local institutions, population and rapid urbanisation combine with unsafe conditions such as dangerous locations and low incomes, leading to disasters.

Hazards such as strong winds and severe drought, which are biophysical in nature, also contribute to situations that make households susceptible to disasters emanating from climate change in South Africa (Goliger & Retief, 2007). It has been noted that climate change is amplifying the frequency and intensity of strong winds (McMichael, Barnett, & McMichael, 2012), and countries such as South Africa will be vulnerable to this (Goliger & Retief, 2007). Strong winds attributed to climate change are going to make life for households in informal settlements in the City of Johannesburg more difficult (Goliger & Retief, 2007; Kruger, Retief, & Goliger, 2013). Notably, literature does not provide statistics on wind related disasters in the whole of Africa due to lack of communication, observation systems, and other factors (Goliger & Retief, 2007). Strong winds in South Africa are of convective (from thunderstorms) and synoptic scale (related to cold fronts) origins (Kruger et al., 2013). The City of Johannesburg experiences winds that are associated mainly with thunderstorms, with a the secondary cause being cold fronts (Kruger, Goliger, Retief, & Sekele, 2010). As already indicated, there is a high level of exposure of urban populations, particularly in informal settlements, to adverse impacts related to climate change (Lewis & Mioch, 2005). This is attributed to the concentration of infrastructure, people and economic activities in these areas (*ibid.*). Increase in population density in urban areas in South Africa has also been associated with the increase of wind-damage reports during September – February months of the year (*ibid.*). Consequently, strong winds cause damage to buildings and houses, and this leads to homelessness, injury and loss of life in informal settlements due to poor housing structures (Lewis & Mioch, 2005; McMichael *et al.*, 2012).

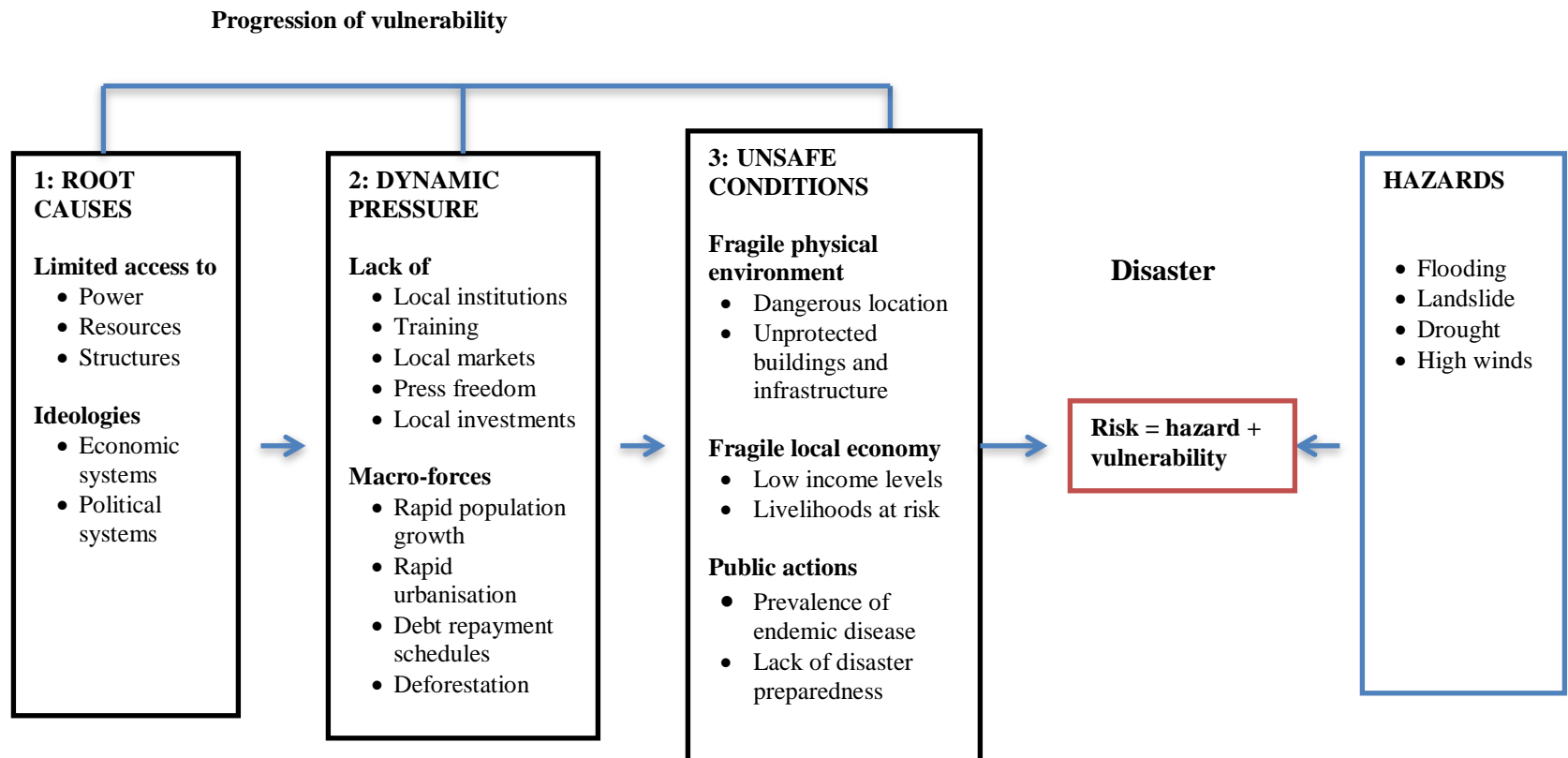


Figure 3.1. The progression of vulnerability diagram as shown through the disaster pressure release model: Adapted from Blaikie et al. (2004, p. 47)

As already noted, social vulnerability is not a function of a hazard or of physical conditions (Brooks, 2003). However, properties of the system determine its exposure to certain hazards and this also relates to the manner in which the human system interacts with the physical environment (*ibid.*). Therefore, social vulnerability can be considered an aspect of human insecurity (Kuriakose, Bizikova, & Bachofen, 2009). Notably, social vulnerability is not necessarily independent from biophysical vulnerability because the biophysical vulnerability could influence social vulnerability (Bell, 2012; Brooks, 2003; Füssel, 2005).

### **3.2.2. Schools of vulnerability assessment**

The choice of either biophysical or social vulnerability (as outlined above) has implications for the angle through which vulnerability is assessed. Vulnerability assessments are done with different policy objectives at different scales (Füssel and Klein, 2006). As an example, different scales can refer to the various spheres of government, *viz.*, municipality, district, province and national. Vulnerability assessments are also moving towards focusing on ‘interdisciplinary analysis of the potential consequences of assessments of climate change’, and ‘integration of climate change with other stressors and concerns’ (Füssel & Klein, 2006, p. 309). There is also a need for a transdisciplinary approach where social and natural sciences interact in developing policy models that could assist in addressing the challenge of vulnerability (Bankoff, Frerks, & Hilhorst, 2004). This is based on the fact that policy-driven assessments could help identify and recommend adaptation options (Füssel & Klein, 2006).

Vulnerability assessments need to consider the difference between starting-point or ending-point vulnerability (Eriksen & Kelly, 2007). The starting-point vulnerability assessment approach is premised on the understanding that vulnerability is a pre-

existing state that is an outcome of multiple faceted processes and factors, that include economic or marginalisation political, that condition household ability to handle stress (*ibid.*). Starting-point vulnerability assumes social vulnerability to be a result of current household vulnerability to both non-climate and climate stressors (Eriksen & Kelly, 2007). The end-point approach to vulnerability (as applied in climate change studies) in turn refers to the residual impacts of climate change that can be observed after adaptation has occurred. The starting point interpretation and end-point interpretation of vulnerability in climate change research are contrasted in the following table (Table 3.2). The starting-point vulnerability notion is more aligned with the social vulnerability school of thought. Its focus is on the socio-economic conditions that are essential to household vulnerability (Hinkel, 2011). On the other context, end-point vulnerability is aligned with biophysical vulnerability approach. In this context, physical harm is significant (Berman, Quinn, & Paavola, 2012). Therefore, the focus in end-point vulnerability is the biophysical impacts resulting from climate change (Eriksen & Kelly, 2007).

Table 3.2: Two interpretations of vulnerability in climate change research

	<b>Starting-point interpretation</b>	<b>End-point interpretation</b>
‘Policy context’	Adaptation policy	Mitigation policy
‘Meaning of vulnerability’	‘Susceptibility to climate change as determined by socio-economic factors’	‘Expected net-damage for a given level of climate change’
‘Vulnerability and adaptive capacity’	‘Vulnerability determines adaptive capacity’	‘Adaptive capacity determines vulnerability’
‘Main problem’	‘Social vulnerability’	‘Climate change’
Main solutions to the problem	‘Social adaptation, sustainable development’	Climate change mitigation, technical adaptation, and compensation
Tentative research	Why are some groups	What are expected net-impacts of

questions	more affected by climatic hazards than others?	climate change in different regions?
Timing of adaptation	‘Adaptation to current climate change’	‘Adaptation to future climatic change’

Source: Adapted from Füssel (2005, p. 20) and (Bell, 2012, p. 53).

As discussed earlier, the IPCC definition of vulnerability and the one used here state that vulnerability tends to focus on the following key aspects: system, hazard, exposure, sensitivity and capacity to adapt. A hazard can mean a potentially harmful event or activity that can lead to damage, injury, environmental degradation, social and economic disruption (Füssel, 2005, 2007b). A system refers to a region, population or sector (Füssel, 2005). This study intends to follow the approach that is aimed at emphasising the social dimension of vulnerability, encompassed in the starting-point interpretation of vulnerability. This is based on the view that a combination of economic, social and political issues could help in shaping the inability and ability of social groups and households (Babugura, 2005) in the two urban informal settlements to respond to climate change.

### **3.2.3. Urban vulnerability in the context of climate change**

The possibility of urban areas experiencing adverse impacts related to climate change has attracted scholars to the study of urban vulnerability. Romero-Lankao & Qin (2001) argues that despite the increase in urbanisation and the prevalence of studies on urban areas, little attention has been paid to the conceptualisation of urban vulnerability in relation to climate change. Further, vulnerability studies on urban areas tend not to portray cities in a positive manner but rather as areas that are going to be harmed due to climate change stresses/hazards (*ibid.*). Further, the hazards cannot be the main aspect of vulnerability; rather vulnerability must be seen as the

intersection of exposure, sensitivity, adaptive capacity and responses (Romero-Lankao & Qin, 2011).

The high concentration of people, infrastructure and economic activities, contribute to the sensitivity of urban populations to the adverse impacts attributed to climate change (Lewis & Mioch, 2005). Institutional capacity (ineffectiveness of governance, paralysis of governments) in relation to particular areas, regions or countries also plays a major role in the vulnerability of local communities in urban areas (Adger, 2006).. Exclusion from decision-making processes is also one of the challenges (*ibid.*). These challenges could be reduced by governance activities that contribute to ‘increased capacity, voice, and influence of low-income groups and vulnerable communities and their partnerships with local governments’ (IPCC, 2014a, p. 18).

It is envisaged that climate change will have differential impacts upon urban communities, and these include impacts on livelihood assets which may be social relations, human capital (*e.g.*, skills), financial resources and infrastructure and natural resources (Lewis & Mioch, 2005). Differential impacts are influenced by factors such as ‘inequities in resource distribution and opportunity’ (Eakin & Luers, 2006a, p. 371). Factors such as class, ethnicity, gender, occupation, and access to resources affect differential capacity to respond (*i.e.*, through coping or adapting) to extreme events (Blaikie et al., 2004; Eakin & Luers, 2006a) emanating from climate change such as extreme cold, heat and rainfall (Douglas et al., 2008; Magrath, 2010; Murray, 2009). Rising temperatures have the potential of causing extreme and frequent weather events that include heavy rainstorms (Douglas et al., 2008; UN-Habitat, 2011). Heavy downpours associated with thunderstorms in the City of Johannesburg are a common occurrence in summer and they make life difficult for households in informal settlements (Kruger et al., 2010). It is, therefore, common that households in informal settlements are continuously exposed to the devastating effects of torrential rains (Murray, 2009). Climate change will lead to new patterns of

extreme weather that include intensity of heavy rains (Lewis & Mioch, 2005; Mann & Jones, 2003).

Household differential access to production resources that include tools, land, skills, livestock, employment, knowledge and social networks play a role on their vulnerability (Blaikie et al., 2004). This explains why in some instances wealthier people suffer less from extreme weather events and children and women are likely to suffer more damage than adults and men (*ibid.*). However, wealthy households can also be exposed to climate change due to the nature of places where they are located such as near river banks and coastal areas (IPCC, 2014a). Households in informal settlements are slightly more exposed to climate change based on the fact that they are sometimes located on unfavourable land, in weak housing structures and with limited assets that inherently negatively affect their adaptive capacity (UN-Habitat, 2011).

Future responses to climate change will depend centrally on what is done in urban centres – which concentrate most of its economic activities and assets, while also housing more than half the global population (IPCC, 2014b). Urban areas also offer opportunities in the development of responses that can help in reducing vulnerability through their enterprises, populations and expertise (UN-Habitat, 2010). These are made easier through the concentrations of infrastructure, economic activities and people in urban areas that provide the economies of scale that help reduce risks from climate change (UN-Habitat, 2011). It is also sometimes easier and cheaper to provide infrastructure such as drainage facilities and services in relatively smaller spaces, and that could help reduce household vulnerability to climate change (*ibid.*). Availability of infrastructure and services provide the basis that could help in coping. Urban households also rely on coping as a form of response to their vulnerability to climate change.



### 3.3. Coping with climate change

Past responses to climate change have been mainly classified into coping and adaptation (Vincent et al., 2013). Coping as a concept originated from development studies, and in particular from the sustainable livelihoods framework (*ibid.*). The concept refers to short-term responses to climate change that do not address underlying causes of vulnerability (*ibid.*). Various scholars indicate that coping mainly constitutes emergency responses to livelihood threats due to climate change at smaller spatial scales with short-term impacts (Berkes & Jolly, 2002; Smit & Wandel, 2006). These responses are mainly provisional ‘mechanisms to ensure survival which do not affect underlying vulnerability (*i.e.*, should exposure to the same hazard occur in the future, farmers will probably experience similar negative effects)’ (Vincent et al., 2013, p. 1). Therefore, coping is interim by nature and it relates to situations whereby different actors respond to climate change related shocks or any adverse stress but their responses are reactive and limited by available resources or low adaptive capacity (*ibid.*). Coping is influenced by factors that include community structures, age, livelihoods, gender and social entitlements that include access to land (Pelling, 2003). Therefore in this context, social and economic differences can influence coping.

There are various examples that can be used to illustrate coping. As an example, coping with idiosyncratic shocks include reactive responses to the death of a breadwinner or to sickness of family members through making short-term loans (Vincent et al., 2013). Some of the coping noted by Vincent et al. (2013) in their study of farmer responses to climate change in southern Africa were receipt of emergency food help from NGOs or government and temporarily migrating to another area. More generic types of coping found across a number of studies focusing on either urban or rural settings (Blaikie et al., 1994; Ellis, 2000; Eriksen, Brown, & Kelly, 2005; Pelling, 2003; Vincent et al., 2013) are captured as follows:

- Impact-minimising and preventative strategies such as household adjustments (*i.e.*, reducing the size of the household through temporary migration);
- Abandonment or sale of fixed assets that include houses and land;
- Specialisation and diversification of livelihoods through pursuing new income sources and engagement by household members in few favoured activities or complementary activities. This involves switching between complementary (irregular and opportunistic sources of food or income) and principal (regular and reliable in providing sources of income or food) activities; and
- Development of support networks (use of existing social capital).

Household capacity to cope depends on the community environment, while the community environment reflects the processes and resources of a region (Smit & Wandel, 2006). On the other context, institutions (both informal and formal) including policies (result of governance), and cultural and social norms also play an important role in how a community, household and individuals may cope with climate change (Berman *et al.*, 2012). This is due to the role they play in shaping and providing the enabling environment that help households and communities to cope (*ibid.*). Coping is not the preferred response to climate due to its temporal nature; rather the ideal household response to climate change should be adaptation.

### **3.4. Climate change adaptation**

Adaptation is not a new phenomenon because individuals and societies have been adapting to climate change over the whole course of the history of humanity (Adger *et al.*, 2009; Adger, Huq, Brown, Conway, & Hulme, 2003). There are two broad approaches by which the adaptation process can be undertaken. Firstly, the building of adaptive capacity, which involves identifying vulnerabilities and taking appropriate action; and secondly, implementation of adaptation actions, which

involves taking steps to reduce vulnerability (Stern, 2007). Climate change adaptation and adaptive capacity (discussed later) are interconnected terms (Engle, 2011). Adaptation is about the human system's response to the surrounding environment (*ibid.*). There is 'a lack of conceptual agreement about what climate change adaptation is' (Callaway, 2004, p. 276). It is only after exposure to extreme events that we can be able to prove that they have adapted. This is due to the fact that there are various approaches to understanding and application of adaptation (UNDP, 2010).

Definitions of adaptation have evolved over time, and they have become more nuanced in order to address the complexities related to adaptation. Adaptation is defined as a 'process through which societies make themselves better able to cope with uncertain future' (UNFCCC, 2007, p. 10) and also manage the opportunities (UNDP, 2010). The definition points to the fact that adaptation is complex as it has to do with preparations for an uncertain future. The UNFCCC definition also focuses more at a macro scale – looking at societal preparation to respond to climate change. Adaptation is 'a process, action or outcome (household, community, group, sector, region, country) in order for the system to better cope with, manage or adjust to some changing condition, stress, hazard, risk or opportunity' (Smit & Wandel, 2006, p. 282). This definition talks about the various levels where adaptation can take place, and of interest is the household level that is the focus of this study. Therefore, adaptation is about adjustments by different actors and at all scales of human systems (including individually, as a household, community and nation) (Berrang-Ford, Ford, & Paterson, 2011). The above two definitions point to the fact that adaptation is not only responding to potential harm, but also taking advantage of emanating opportunities. Notably, adaptation also refers to longer-term shifts in practices and behaviour which can help in the reduction of underlying vulnerability' (Vincent et al., 2013). The information provided in the above definitions places emphasis on the ability of people to prepare themselves to deal with potential impacts of climate change through actions that address underlying vulnerability. The process of adapting

entails community engagements in reducing the negative effects of climate change by making appropriate changes and adjustments (IPCC, 2007a).

Adaptation can be viewed as a process in which communities change production activities, modify of institutions and rules with the aim of securing livelihoods. The process of adaptation can take various forms that include diversifying food production, avoiding building infrastructure and settlements on what become increasingly high risk areas, and strengthening current systems to ensure that they are less exposed to unusual events (Adger et al., 2003). There are five ways to achieve climate change adaptation that were identified by Hay and Mimura (2006, p. 28) and they are listed below:

- ‘Reduction of the chance of a condition or event’;
- ‘Reduction of consequences’;
- ‘Risk sharing’;
- ‘Risk avoidance’; and
- ‘Risk acceptance’.

Adaptation to climate change depends on various factors that are political, social, economic, institutional and technological (Vincent, 2007a). The adaptation process is aimed at moderating and reducing the negative impacts, avoiding danger and also realising the positive effects of climate change (Smit & Wandel, 2006). Benefits of adaptation can be valued differently depending on the economic, social and political contexts in which they happen (Klein, Schipper, & Dessai, 2005). Furthermore, barriers for household in adapting to climate change are knowledge, biophysical, finance, political and social (Shackleton, Ziervogel, Sallu, Gill, & Tschakert, 2015).

### 3.4.1. Types of adaptation and determinants

There are various ways of categorising forms of adaptation. These are: private versus public adaptation, anticipatory versus reactive adaptation, and autonomous versus planned adaptation (see more discussions below) (Moench, 2010). Table 3.3 provides examples of adaptation activities under these categories, although they are not very easy to classify because some of them could fall under either of the categories. Adaptation can be either ‘hard’ and examples include infrastructure projects such as walls, irrigation schemes and dams, or ‘soft’ reactions that include invisible changes such as planning, practice and behaviour (Fankhauser & Burton, 2011, p. 1044).

Variables that are found in urban areas that affect adaptation include low literacy levels, access to resources, skills and management capacity (Madzwamuse, 2010). Other determinants include access to technology and resources (Pelling & High, 2005). Furthermore, socio-economic status and availability of information on climate change (*ibid.*). Poor management, low skills and limited access to resources could limit the opportunity for households to build their adaptive capacity (*ibid.*).

Table 3.3: Examples of adaptation to climate change

		<b>Anticipatory</b>	<b>Reactive</b>
<b>Human systems</b>	<b>Natural system</b>		Changes in length of growing season Ecosystem change
	<b>Private</b>	Purchasing insurance Building a house on stilts Redesigning oil rigs	Changing of farm practices Changing insurance premiums Purchasing air conditioning

	<b>Public</b>	Develop early warning systems Develop new building codes Designing standards and incentives for relocating	Subsidies, contemporary payments Enforcing building codes
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Source: Adopted from Klein (2003)

### 3.4.2. Anticipatory versus reactive adaptation

Anticipatory adaptation is proactive in nature and it is aimed at reducing the impacts of climate change and enabling faster recovery (Bell, 2012; Chishakwe, Murray, & Chambwera, 2012). As an example, it involves a household protecting itself from adverse impacts of climate change such as floods through preventative measures such as building brick walls or elevating the foundations of shacks. Anticipatory measures can, for instance, involve relocation to areas that are not flood prone to avoid flood damage through the elevation of building foundations. Anticipatory actions rely mainly on early warnings. Reactive adaptation involves household responses to climate change impacts such as floods after they have occurred (Chishakwe et al., 2012; Cohen, Sykes, Wheaton, & Stevens, 2002). This takes place after households have suffered from climate change impacts. It also takes place after observation of climate change (Cohen et al., 2002).

### 3.4.3. Private versus public adaptation

Private adaptation is mainly viewed as spontaneous and it occurs without prior planning, whereas public adaptation is viewed as planned actions that are deliberately conducted by public agencies (Smit *et al.*, 2001). Thus, private adaptation results from initiatives and actions taken by individuals and households. It also includes

actions taken by private companies aimed at promoting self-interests (Cohen et al., 2002). Public adaptation is mainly top-down and it is driven through projects, laws and policies that are government driven and aimed at addressing collective public needs (Chishakwe et al., 2012; Cohen et al., 2002).

#### **3.4.4. Community-based adaptation**

Community-based adaptation is explained as a process of empowering local communities to enable them to plan and cope with the impacts of climate change (Reid, Huq, & Murray, 2010). Therefore, this process is viewed as a bottom-up approach that places local institutions at the centre of development (Chishakwe *et al.*, 2012). The adaptation process is driven by local capacities, knowledge, needs, and priorities, and it is led by the community (Reid *et al.*, 2010). It may also be driven by local expertise, but sometimes it relies on indigenous knowledge systems. Community-based adaptation activities attempt to factor in the potential impacts of climate change on livelihoods (*ibid.*), and also to put empowerment and poverty-reduction at the centre (Chishakwe *et al.*, 2012).

There is a debate about the role of the scientific community in community-based processes, and Chishakwe *et al.* (2012) argue that the role of the scientific community in the community-based adaptation process is one of learning and facilitating rather than one of being a source of knowledge or teaching. Methods that can be applied by researchers for community driven adaptation include transect walks, community mapping and other participation-promoting methods (*ibid.*). These methods can enable the community to identify its vulnerabilities and factors that are the foundations of its coping and adaptation to climate change. Participatory approaches help the researcher to reap local knowledge and understand coping strategies that could help inform planning and citywide strategies (*ibid.*). Therefore, community-based adaptation projects promote co-learning and therefore drawing on scientific

knowledge is key but this needs to be translated into local languages. Types of adaptation that can be considered when studying community-adaptation include *in situ* adaptation, behavioural and physical change (Williamson et al., 2010). Community-based adaptation projects have mainly been focused on rural areas but they provide experiences and solutions that can be beneficial to households in urban areas (see Table 3.4 for examples).

Table 3.4: Selected examples of community-based adaptation projects

<b>Project name</b>	<b>Why they are adaptation projects?</b>	<b>Place</b>	<b>Year</b>
Participatory plant breeding to develop drought resistant rice	The Begnas village community decided to bring back the drought-resistant rice that they used to plant upon realisation of the decrease in yields related to climate change. Farmers involved researchers to select local rice varieties with high yield and drought-resistance. The community selected rice called MANSARA which had high yields but it was poor in taste. It was crossbred with another one to produce good tasting rice adapted to the local microclimate.	Begnas village, Nepal	2003 - 2005
Cultivating wild rooibos as an adaptation strategy	This community is implementing soil and water conservation actions to address the impact of the decrease of rainfall on local Rooibos tea farming.	Suid-Bokkeveld Community, South Africa	Since 2006
Developing floating gardens	In response to flooding, local communities started using floating	Bangladesh	2004 - 2007



	gardens because they allow for growing seedlings during floods. The seedlings are then transplanted when floods have receded.		
Improving traditional irrigation systems	This involved repairing pipes damaged by floods compensating for less groundwater availability. There was also a move by the local community to plant off-season cash crops that require limited irrigation, addressing the shortage of cereals due to erratic rainfall.	Nepal	Since 2004
Incorporating coastal hazards into community planning and avoiding building close to water	The Tuktoyaktuk community resides on low-lying areas surrounded by the ocean that is frozen half of the year. The community is facing flooding and rising sea-level challenges. They are addressing this by avoiding building close to the ocean.	Tuktoyaktuk, Canadian western Arctic	2008

Sources: (Adhikari, Subedi, Shrestha, Shrestha, & Mandhar, 2008; Arendse & Blaauw, 2008; Berger & Ali, 2008; Bhandari & Gurung, 2008; Smit, 2008).

### **3.4.5. Challenges of government interventions in improving adaptation in an urban context**

Governments have a role to play in promoting adaptation, and this could be done through policies and projects (Mukheibir & Ziervogel, 2007). The mechanisms through which governments play a role include allowing, encouraging and supporting adaptation activities (IPCC, 2014b). Another key aspect is the use of policies and regulations as a control mechanism to promote adaptation (*ibid.*). Frameworks to

support urban adaptation and enabling conditions are grounded in local competence, institutional structures, interest, analytical capacity and awareness (*ibid.*). Therefore, institutional and urban governance failure (*i.e.*, inefficient policies, undefined property rights, regulatory complexity, poor leadership, corruption and restriction of movement) have the potential to derail climate change adaptation initiatives (Agrawal, 2008). Furthermore, in order for urban areas to advance their implementation of adaptation, there is a need for mainstreaming it into long-term plans and finding political champions (Mukheibir & Ziervogel, 2007; Roberts, 2008). This requires a certain level of advocacy aimed at making politicians understand the implications of long-term development results arising from short-term decisions that can exacerbate climate change (*ibid.*).

Cities in low and middle-income countries<sup>2</sup> will spend a substantial amount of resources that are currently limited in order to adapt to climate change (UN-Habitat, 2011) and this will be related to building climate-proof infrastructure and the provision of services (Ayers, 2009). Apart from the challenge of available resources, adaptation is also hampered by the lack of capacity in governments (especially at a local level) to access and utilise international resources that may be available for this purpose (*ibid.*). Despite these challenges, those governing urban areas need to focus on adaptation to reduce the negative effects of climate change on people, especially those in vulnerable conditions regardless of their socio-economic status (Satterthwaite, 2010). An important aspect of a governance focus on adaptation is the mainstreaming of adaptation into decision-making processes and development planning through participatory approaches that involve all actors (UNDP, 2010).

The limited understanding of vulnerability and adaptation, particularly in developing countries will also pose a challenge in developing effective adaptation interventions at a city level (*ibid.*). The other challenge is the ‘uncertainty in developing adaptive capacity at many different scales, from household level to that of nations’ (Vincent,

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<sup>2</sup> Examples of low-income countries are Zimbabwe and Lesotho, and South Africa is a middle-income country.

2007a, p. 22). Drafting adaptation strategies will also be complicated by the fact that climate change impacts cannot be determined with certainty and systems are often affected by a multiplicity of stressors (UNDP, 2010). This is the challenge that city planners and managers need to confront. However, despite uncertainties and challenges, policy-driven assessments remain crucial (Vincent, 2007a).

To enhance the capacity of vulnerable urban households to adapt, especially in informal settlements, we need to understand the nature of their vulnerability and how this has changed over time. In Chapter 2, I reviewed the various challenges confronting households in urban areas, in particular informal settlements such as overcrowding, location of houses in hazardous and vulnerable areas, limited access to sanitation and safe water which are influenced by the prevailing state of governance (Adeniji & Ogundiji, 2009). The urban households, such as those in informal settlements, who live in the most exposed urban environments will adversely feel the impacts of climate change (UNDP, 2007a). Informal settlement residents often ‘have problematic relationships with local government yet local government is meant to be the institution that acts to reduce these risks’ (United Nations, 2002:8). The problematic relationship is sometimes based on the anti-informal settlements approaches of local governments that are often based on misconceptions, misrepresentation and exaggeration (*ibid.*). It is also difficult to capture accurate data from these areas because they are under rapid and constant change in a manner that is seldom predictable or linear (*ibid.*). This has made governments to rely on ‘convenient causal explanations’ for the existence and growth of informal settlements (*ibid.*:24). This situation has made it easy for different actors to misrepresent and exaggerate the conditions of informal settlements, including the population statistics, of informal settlements for various purposes, and this further complicates research in these areas (*ibid.*).

There is also a challenge where climate change adaptation actions by governments can inadvertently lead to an increase in vulnerability, at least for some people. This is

termed maladaptation (Global Environmental Change, 2010; UNDP, 2010). Maladaptation can be defined as:

‘development which, by overlooking climate change impacts, inadvertently increases exposure and/or vulnerability to climate change. Maladaptation could also include actions undertaken to adapt to climate impacts that do not succeed in reducing vulnerability but increase it instead’ (UNDP, 2010, p. 18).

Maladaptation is a risk to informal settlements, especially when adaptation is not spatially targeted to the reality of these communities. An example could involve the provision of low-cost housing in distant areas that are not located near any form of economic activities. For low-income households, this may address their immediate needs such as exposure to extreme heat, flooding and cold. However, being located away from economic activities means that their incomes may be negatively affected due to the increased costs of commuting to major economic hubs in the urban areas. Reduced household income could further worsen their vulnerability because income could help in enhancing household capacity to adapt to climate change related vulnerability through investments in better dwelling structures (Chishakwe *et al.*, 2012).

### **3.5. Vulnerability and adaptation in South Africa: Policy and perspectives**

The adoption of the National Climate Change Response White Paper shows the South African government’s commitment to addressing climate change both in rural and urban areas. The policy provides the vision for ‘an effective climate response and long-term, just transition to a climate resilient and lower-carbon economy and society’ (NDEA, 2011, p. 5). The climate change policy further acknowledges that, ‘informal settlements are vulnerable to floods and fires, exacerbated by their location in flood or ponding prone areas and sand dunes; inferior building materials; and inadequate road access for emergency vehicles’ as a result of their exposure and

sensitivity (as outlined in the conceptual framework, Chapter 4) (*ibid.*:22). The policy suggests the implementation of low-cost housing as a solution to the challenge of informal settlements, but no further solutions are provided specifically on dealing with climate change in these areas (*ibid.*).

The City of Johannesburg adopted a Climate Change Adaptation Plan in 2009, and the province of Gauteng where the city is located has developed its Climate Change Response Strategy and Action Plan in 2011. The city's communities in informal settlements are likely to face substantial and significant impacts from climate change (CoJb, 2009) such as on their health (Pelling, 2003). The city will be exposed to climate change related issues that include food and water security, flooding, and migration/refugees (*ibid.*). It is envisaged that the city's informal settlements will experience more exposure and this will render them more vulnerable to disasters related to flooding (*ibid.*). The city administrators have noted that some low-cost developments are also taking place without storm water drainage facilities and this increases vulnerability to climate change (*ibid.*). Further, the city also admits that the poorest communities in informal settlements are more likely to be exposed to climate change related risks because they reside in areas that have limited resources (*i.e.*, health, education, financial and physical resources) that could help them to adapt or to start engaging in measures that could help in risk reduction (such as purchasing flood damage insurance) (CoJb, 2009). These deprivations vividly portray the city's failure to proactively absorb the poor as articulated in its 2006 Growth and Development Strategy (Huchzermeyer, 2011).

The City of Johannesburg's Adaptation Plan notes that reducing exposure to climate change by informal settlement communities should involve poverty alleviation, relocation of settlements from floodplains, expansion of job opportunities, extension of basic housing and infrastructure, and improving primary health care and education (CoJb, 2009). The city also indicates that it intends to assess flood lines to guide future developments and develop early warning systems (*ibid.*). In terms of informal

settlements, the plan to reduce exposure to climate change is to prevent their location on flood-prone areas, relocations from flood basins to safe areas and educating communities about climate change related risks (*ibid.*). Although these actions are going to be beneficial, the likelihood of this happening soon is limited due to challenges such as resource constraints. This is another reason why this study is interested in the adaptive capacity of households in the two settlements.

### **3.6. Adaptive capacity**

An understanding of adaptive capacity in relation to climate change is key in policy-making (Engle, 2011). This is based on the fact that if we understand the nature of adaptive capacity that households have, we are able to undertake actions that could help in building it in order to reduce potential adverse impacts of climate change (*ibid.*). The advantage is the fact that the concept of adaptive capacity is ‘translatable to decision makers through its emphasis on governance, institutions, and management’ (Engle, 2011, p. 652). Adaptive capacity is about the ability of human systems to absorb and recover from climate change related losses and to modify exposure to risks (Vincent, 2007a), and this can be done proactively (changing despite no environmental changes or stresses) or reactively (in response to environmental change) (Gallopín, 2006). Furthermore, adaptive capacity is required in dealing with future impacts related to climate change (Berman *et al.*, 2012).

The IPCC defines adaptive capacity as ‘the whole of capabilities, resources and institutions of a country or a region to implement effective adaptation measures’ (IPCC, 2008, p. 76). Adaptive capacity is also defined as ‘the ability or capacity to modify or change its [individual or community] characteristics or behaviour’ in relation to ‘existing or anticipated external stresses’ (Brooks, 2003, p. 8). The two

definitions show that adaptive capacity has to do with people's ability/capacity to mobilise resources, anticipate and respond to current or perceived stresses (Engle, 2011). The adaptive capacity of human systems from the individual to humankind is viewed as the capacity to maintain/increase the quality of life in a given or range of environments (Gallopín, 2006). The focus of the two definitions on human systems makes them appropriate for this study, which is focused on the social vulnerability approach and the assessment of adaptive capacity as a component of vulnerability.

Studies of adaptive capacity are sometimes considered more useful than that of adaptation based on the fact that adaptation is difficult to measure and its effectiveness can only be determined when a system has been exposed to a hazard (Füssel & Klein, 2006). The ability of people to respond to climate change also differs from household to household.

### **3.6.1. Determinants and characterisation of adaptive capacity**

Determinants of adaptive capacity are similar to those for adaptation. These include technology, resources, skills, information, equity and institutions, and they are interdependent (Smit & Wandel, 2006). At a community level, the factors are access to infrastructure, technology, location, services, social networks and services (*ibid.*). In urban areas, the determinants can include institutional aspects related to governance, urban planning, and quality of policy responses (*ibid.*). At household level, these determinants are gender, age, housing, assets, education, sanitation, income, health, migration status and ethnicity (Romero-Lankao & Tribbia, 2009). This study focuses on determinants categorised as follows, *viz.*, physical capital (assets, infrastructure, and dwelling structure/ housing), financial capital (income), human capital (skills, knowledge, gender, health) and social capital (social networks)

and governance (*i.e.*, relationships, services). There are five adaptive capacity characteristics that are important to households in the following table (Table 3.5). These characteristics are also similar to determinants of adaptive capacity already discussed above.

Table 3.5: Characteristics of adaptive capacity

Characteristics	Description
<b>Asset base</b>	Physical capital, financial capital, natural capital, social capital, political capital and human capital.
<b>Governance</b>	Transparency, informed decision-making and flexibility.
<b>Institutions and entitlements</b>	Entitlements to key resources needed to adapt: age, ethnicity, gender, religion, <i>etc.</i> Institutions: allowing all groups including the marginalised to have equitable opportunities to access resources.
<b>Knowledge and information</b>	Knowledge of adaptation options.
<b>Innovation</b>	Autonomous, local-level initiatives, exploration and experimentation.

Source: Chishakwe *et al.* (2012)

Limitations of communities to adapt include weak social capital, inability to work collectively, and ineffectiveness of local organisations and ineffective governance (Pelling & High, 2005). These limitations vary from one community or household to another. Households that have better access to resources such as income and diverse livelihood sources have been noted to have a stronger adaptive capacity (Bell, 2012; Pelling & High, 2005). In contrast, households with limited access to those resources may have a relatively lower adaptive capacity because of limited income and livelihood sources (*ibid.*). Households with limited resources may also have higher adaptive capacity because they can easily rebuild their shacks, unlike people with formal houses that may require more resources to reconstruct.



Adaptive capacity determinants are complex because they are not only dependent on socio-economic circumstances such as poverty and wealth, and they vary depending on scale (Posey, 2009). At a community level adaptive capacity can be determined by social networks and socio-economic conditions, while at the municipality level this can be influenced by professionalism of employees, participatory approaches, knowledge-sharing, financial capacity and governing regime (*ibid.*).

Scale needs to be accurately determined for any study on adaptive capacity (Posey, 2009; Vincent, 2007a). This implies that it is important to decide whether to study adaptive capacity at a community level, individual or regional level. However, Posey (2009) in his study of floodplain management programmes in the United States (US), found that individual indicators of socio-economic conditions can be aggregated at a group level in order to predict the possibility of particular adaptation to be undertaken at municipal or community level (*ibid.*). Adaptive capacity (like vulnerability) varies from household to household, among individuals and social groups over time, and therefore it is context-specific (Smit & Wandel, 2006). The ability of the household to invest in adaptive capacity is influenced by income, cost, prices, remoteness, isolation, access and natural endowments (Williamson et al., 2010).

Further, attention should be paid to adaptive capacity deficits and barriers found in both urban and rural areas, produced through:

- Knowledge and information gaps (*i.e.*, knowledge gaps, low science capacity on climate change issues, limited climate change awareness of risks and limited access to information);
- Social systems failure (*i.e.*, significant divisions based on gender, class, race, religion; social conflict, and others); and

- Market or economic failure (*i.e.*, limited supply of public goods that include education, public infrastructure, emergency services, social services, inefficient taxation and others).  
(Williamson et al., 2010).

### **3.6.2. Household adaptive capacity**

The household is an important level in society where key decisions are made to deal with uncertainties, including those arising from climate change (Alinovi, Mane, & Romano, 2009). Building household adaptive capacity requires a better understanding of household socio-economic circumstances, access to resources, demographic composition, access to facilities, services and employment opportunities (*ibid.*), and it must involve those at risk (Leary *et al.*, 2008). Furthermore, building household adaptive capacity must be done cautiously and in a targeted manner as, in many instances, government resources are limited (Alinovi et al., 2009). Assessing adaptive capacity at the level of the household<sup>3</sup> could help enable planning and identification of adaptation priorities (Ghimire, Shivakoti, & Perret, 2010).

Assets and debts play a role in vulnerability and the potential of households to build adaptive capacity (Alinovi et al., 2009; Shackleton et al., 2015). Government support and access to credit (debts) are crucial factors in influencing the move by households from coping to adaptation (Bryan, Deressa, Gbetibouo, & Ringler, 2009). Debts play a role in household vulnerability to shocks including those related to climate change; this is related to the fact that they drain household resources that could help in building adaptive capacity (Scott, 2006). This is more the case when household debt is equal to a ‘large share of total household expenditure’ (*ibid.*:7). Therefore, in this case the household after servicing debts will be left with minimal disposable income

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<sup>3</sup> According Byrne (1999: p.110), a household is a ‘combination of pooled consumption and shared residence’.

and this may limit its response to climate change and building of its adaptive capacity.

Household access to institutions can help in building adaptive capacity and adaptation (Agrawal, 2008). Civic institutions provide participatory platforms that play a role in engagements and decision-making by different stakeholders. These institutions include cooperatives, loans and savings associations (*ibid.*). Some of these institutions are also referred to as ‘informal insurance schemes’ and they are viewed as a manifestation of, and contributor to, the growth of social capital which plays a significant role in household adaptive capacity (Vincent, 2007b). This is key in places such as informal settlements where people are exposed to minimal resources and relatively weaker physical infrastructure to help them adapt to climate change. In these situations, social networks and institutions could help in building much needed adaptive capacity.

### **3.6.3. Methodologies for assessing adaptive capacity**

Although the notion of adaptive capacity is not new, its assessment has not yet received adequate attention (Engle, 2011; Vincent, 2007a). Adaptive capacity is still easier to assess as compared to adaptation. Further, assessing adaptive capacity is multi-disciplinary in nature and it touches on areas that include sociology, law, human geography and economics (Williamson et al., 2010). Therefore, assessments of adaptive capacity must flexibly use different methodological approaches that could help in the production of knowledge (Füssel, 2007a).

Adaptive capacity assessments can be conducted to provide policy guidance and justify resource allocation (Vincent, 2007a). Studies of adaptive capacity can help to identify factors that inhibit or facilitate adaptation in a comparative and systematic manner (Engle, 2011). This process can help to develop indicators which are useful in

assessing vulnerability and enabling adaptive capacity comparisons (Vincent, 2007a). Vincent (2007a) argues that although indicators are controversial, they provide a way for policy-makers to quantifying adaptive capacity. Indicators can also help in monitoring change related to adaptation interventions that have been implemented by households (*ibid.*). While indicators are useful, they do not necessarily provide in-depth insight that a qualitative research can offer.

### **3.7. Vulnerability, coping, adaptive capacity and adaptation: What is the relationship?**

It is commonly understood that vulnerability, coping, adaptive capacity and adaptation are interconnected in a variety of ways (Bell, 2012; Füssel, 2007a; IPCC, 2007a). As already noted, vulnerability is an outcome of exposure, sensitivity and adaptive capacity. Coping is about short-term responses to these extreme weather events without addressing the underlying causes of vulnerability. Therefore, coping activities cannot help households deal with vulnerability and building long-term adaptation because they return to the state they were in before being affected by hazards such as floods (Vincent et al., 2013). However, current coping actions can influence future and present opportunities that could help in building adaptive capacity (Berman *et al.*, 2012). Coping and adaptive capacity are flexible and responsive to social, economic, institutional and political changes over time (*ibid.*). Adaptation is viewed as manifestations of adaptive capacity and it is about actions undertaken by households aimed at addressing underlying conditions that make them vulnerable to climate change (*ibid.*). The challenge with adaptation is that it can only be seen after households have been affected by extreme weather events. The nature of impact and responses could help us understand how households have adapted. This limitation has contributed to my decision to look at household adaptive capacity in the two settlements.

### **3.8. Conclusion**

In this chapter, I provided a review of literature focusing on vulnerability, coping, adaptation and adaptive capacity. Household exposure, sensitivity and adaptive capacity in relation to increased frequency and severity of extreme weather events is central in this study. This study is aligned with the social vulnerability and starting-point vulnerability approaches, based on the notion that household socio-economic circumstances play a primary role in vulnerability in addition to the biophysical environment. Thus, in this context vulnerability in the two informal settlements already existed at the starting point of my study as a result of their susceptibility to harm emanating from extreme weather events such floods, cold, heat and heavy rainfall (Kruger et al., 2010).

Furthermore, this chapter also looked at urban vulnerability, focusing on households in informal settlements. Households in informal settlements struggle with various challenges that include being located in sensitive environments. These households also have challenges such as poverty, unemployment and services access. Informal settlements also have limited access to economic opportunities, services and infrastructure and this affects their ability to respond to extreme weather events. Households respond to climate change through efforts that constitute coping, adaptation and adaptive capacity. Coping involves short-term responses to climate change by households and in this situation adaptive capacity is low and households remain vulnerable.

Adaptive capacity mainly refers to the ability of a household to transform its behaviour and characteristics in order to be able to handle current and anticipated threats (IPCC, 2007c). This involves reducing the consequences and avoiding risks related to climate change events (Brooks, 2003). Adaptive capacity is also influenced by the nature of governance. Poor governance and factors such as weak social networks, weak service delivery and limited access to information on climate change

can produce adaptive capacity deficits (Williamson et al., 2010). Further, governance, economic and political failure can also lead to adaptive capacity deficits (*ibid.*). Therefore, improved governance, access to information and economic opportunities are some of factors that shape household adaptive capacity. For households in informal settlements, adaptation involves activities such as building shacks away from the flood lines. However, this is complicated by the challenge of access to land and related services in urban areas such as the City of Johannesburg. Adaptive capacity is determined by factors such as housing structure, gender, income, health and assets (Romero-Lankao & Tribbia, 2009), and these are discussed in Chapters 5, 6 and 7 on findings.

The following chapter outlines the research methodology and conceptual framework for this study based on debates through the review on literature on vulnerability, coping, adaptive capacity and adaptation in urban areas.

## **4. CHAPTER FOUR: CONTEXT AND RESEARCH METHODS**

#### **4.1. Introduction**

This chapter builds on the two preceding literature review chapters that highlighted the complexity of informal settlements and climate change respectively. The focus of the chapter is to provide a conceptual framework that interconnects the complex concepts related to informal settlements and climate change that I covered in the previous chapters. The chapter also contextualises the study within the City of Johannesburg and the selected informal settlements, and translates the conceptual framework and context into a methodology for the empirical work. The conceptual framework shows how the concepts interact as a lens for this study. In this sense, this chapter lays the foundation for a discussion and analysis of the research findings in the chapters that follow.

This chapter lays down the methodology chosen and the data gathering process followed. It outlines the sources of data (both primary and secondary) and how data were collected, captured and analysed. The research method applied was chosen based on the type of the information sought (both qualitative and quantitative in this case), application, purpose of research, number of contacts sought, period of reference and the nature of investigation. Thus, the methodology was also influenced by the problem that is being explored and the constraints of doing research in an informal settlement. The chapter also discusses the ethical issues, validity and reliability related to the study. Ultimately, these factors are considered in the interpretation of data and presentation of findings in the chapters that follow.

#### **4.2. Research conceptual framework**

As noted in the introduction, this section on the conceptual framework identifies and links critical concepts that formed an integral part of the study. A conceptual framework is defined as ‘an alignment of key concepts of the study’ (Henning, van



Rensburg, & Smit, 2004, p. 26). The framework also helps in the positioning of the study ‘in the bigger research enterprise’ (*ibid.*:26). The conceptual framework links the main concepts of exposure, sensitivity and household adaptive capacity (discussed in Chapter 3 and also referred to below) that are central to this study. These concepts are further linked with governance and LED. As outlined in chapters 2 and 3, key concepts for this study are:

- Informal settlements;
- Climate change;
- Vulnerability;
- Exposure;
- Sensitivity;
- Coping;
- Adaptive capacity;
- Adaptation;
- LED; and
- Governance.

Figure 4.1 outlines the framework showing the alignment between these concepts. Household exposure to climate change appears at the top of the framework. On the left, the framework considers the concept of social vulnerability, highlighting key aspects that affect household vulnerability such as social capital, LED and governance. The biophysical environment (as shown on the right hand side of Figure 4.1) also plays a contributory role to household vulnerability to climate change.

Examples of climate change exposure include floods, extreme temperature, droughts, disease and other elements. Exposure to these hazards can affect the quality of life of households in informal settlements. Combined with the situation of vulnerability, they have the potential to translate into food and livelihood insecurity, migration

(in/out) and asset destruction. Vulnerability, or the lack of adaptive capacity, can also be caused by limited resources provided by the government (Adeniji & Ogundiji, 2009). This also affects how households respond. The impacts of climate change are mediated by household social, financial, natural and human capital. These varying forms of capital play a role in how households respond to climate change. When adaptive capacity is low, households are only able to cope with the hazard exposure. When it is higher, they are able to adapt.

Poor access to governance structures can increase vulnerability. Local government on the other hand can help to enhance the adaptive capacity of households in informal settlements through the provision of services, support to household economic activities (under LED), provision of social security options and promoting inclusive participation.

As shown in the centre of the conceptual framework, adaptive capacity plays a key role in enabling households to deal with both biophysical vulnerability and social vulnerability. Household responses in dealing with both biophysical vulnerability and social vulnerability can include coping, improving adaptive capacity and ultimately adapting to climate change.

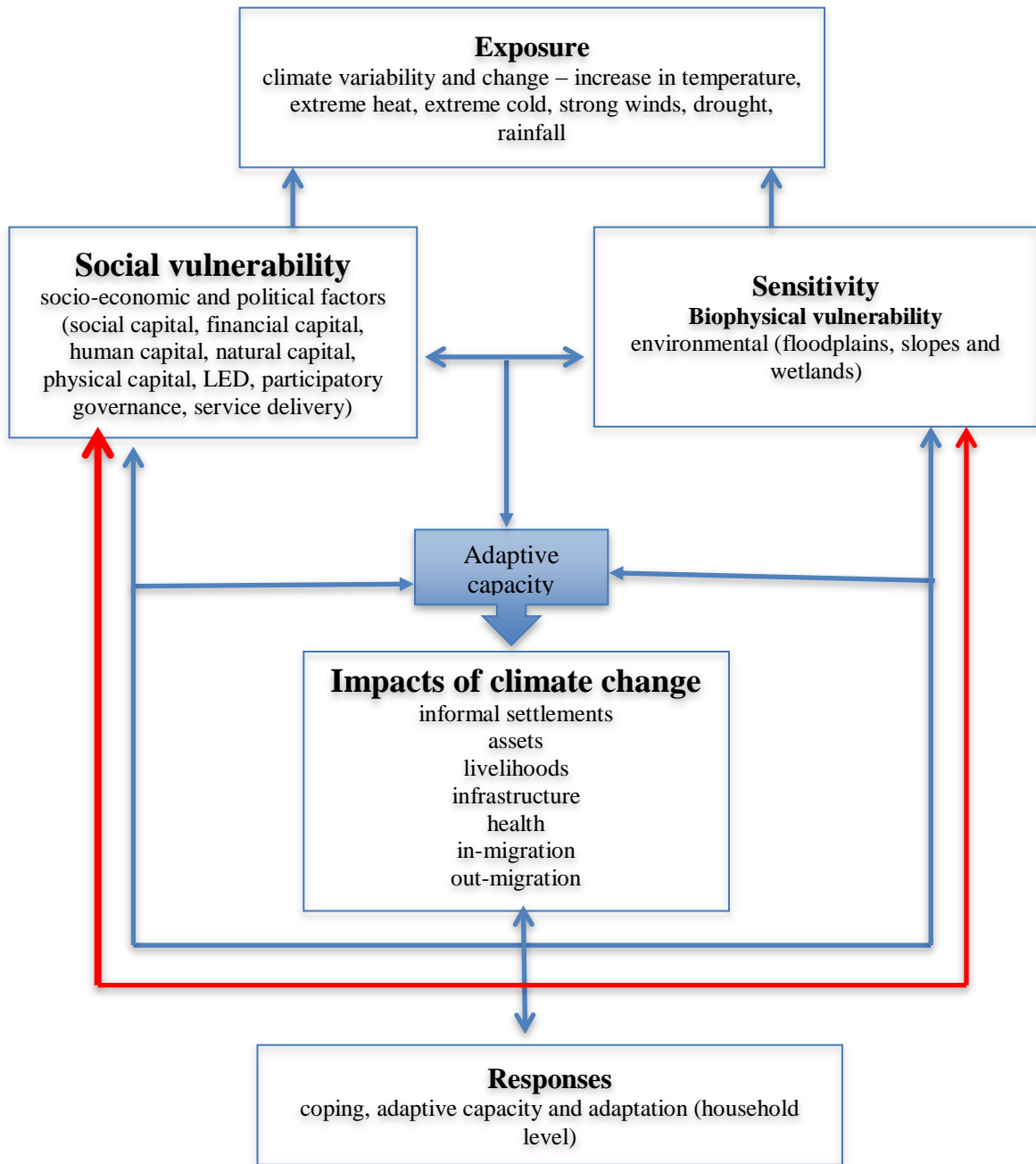


Figure 4.1: Conceptual framework<sup>4</sup>

<sup>4</sup> Red feedback loop represents coping – that may increase social or biophysical vulnerability or – at best – not change the status. Blue feedback loop is adaptation – which will decrease social and/or biophysical vulnerability

### 4.3. Case study area, unit of analysis and site selection

As already mentioned in Chapter 1, this study’s geographical focus is the City of Johannesburg, specifically targeting households in Msawawa and Freedom Charter Square informal settlements as the units of analysis. The City of Johannesburg has more than one hundred and thirty informal settlements as per the National Upgrading Support Programme (NUSP) (CoJ, 2010b). Informal settlements in Johannesburg generally have various characteristics as shown in Table 4.1 below. These characteristics are used to categorise informal settlements in the City of Johannesburg that are relevant to this study. It provides examples of informal settlements within these categories, indicating that Msawawa and Freedom Charter Square, while unique in certain ways, share characteristics with other settlements in City of Johannesburg.

Table 4.1: Grouping of informal settlements based on characteristics

<b>Informal settlements characteristics</b>	<b>Name of informal settlement<sup>5</sup></b>
High population density	Slovo, Zamimpilo, George Goch Station, Princess Backyard, Princess Crossing, <b>Freedom Charter</b> , <b>Msawawa</b> , Mangolongolo
Orderly layout	Sweetwaters, Orange Farm, Drieziek X3,
Located on dolomite	Thembelihle, Protea South, Angola and Slovo Park
Located along major routes (railway line and road)	St Mary’s, Naledi 2 and 3; Naledi (Thladi), George Goch Hostel, Mangolongolo, Princess Backyard, Princess crossing, Denver, Holomisa,

<sup>5</sup> The list provided does not include all informal settlements in the city.

	Coalyard, New Canada, Nomzamo, Orlando Park, <b>Freedom Charter</b> , Slovo, Zamimpilo, Racecourse, Mofolo North, Kliptown, Ngubane, Winnie Camp, Kliptown Market, Princess (Plot 44, 19, 16 and 44), Leghorn Street
Located in part below a flood line	Tshwetla, <b>Freedom Charter Square (near Klip River)</b> , <b>Msawawa (located near the Jukskei River)</b> and Slovo Park
Exponential growth in terms of population	<b>Msawawa</b> , Lawley Station, Kya Sands
Age of the settlement (established before 1994)	<b>Freedom Charter</b> , Tshwetla, Kliptown Tamatievlei, Lawley Dumpsite and Happy Valley
Located near upmarket suburbs	<b>Msawawa</b> , Kya Sands, Tshwetla, Thembelihle and Lindhaven

Source: Huchzermeyer et al. (2014) and author's own analysis

Based on the complexities described in previous chapters, this study adopted a case study approach taking advantage of the potential of such an approach to be used in exploring complex issues in-depth. The case study is an 'intensive description and analysis of a phenomenon or social unit such as an individual, group, institution or community' (Merriam, 2002, p. 8). This approach involves 'understanding the uniqueness and idiosyncrasy of a particular case in all its complexity' (Kruger & Welman, 2001, p. 21). The purpose of focusing on two purposively chosen cases in this study is to investigate Msawawa and Freedom Charter Square and be able to understand their intricacies in depth. The other purpose of focusing on the two case studies was to gather data at a household level that would enable a comparative analysis that could depict both similarities

and differences. The choice of focusing on households is based on the fact that drivers of social vulnerability differ at household level, and the characteristics of each household play a role on how they are affected by climate change (Brooks, 2003; Pelling, 2003) .

As outlined in Chapter 3, household vulnerability is affected by biophysical factors (*i.e.*, physical location) and socio-economic factors. The two target informal settlements that have been chosen, Freedom Charter Square and Msawawa (discussed in more detail below), are highlighted in bold in the above list. Reasons for selecting these two settlements were that they exemplified the above-mentioned drivers of vulnerability and that some parts of these settlements are situated under the flood line, and therefore to an extent they experience similar levels of biophysical vulnerability. The settlements are ideal for investigating the differences in social vulnerability and how that has affected past responses to climate change. This is due to the fact that households that are considered socially vulnerable due to issues such as poverty, health and unemployment mainly occupy them. The key issues that the study focuses on are household exposure and vulnerability to climate change, and governance. As already pointed out, informal settlements are in part an outcome of shortfalls in governance (multi-stakeholder engagements involving the state but tending to exclude informal settlement residents), therefore the two settlements also provide the basis to understand how governance impacts on coping, adaptation and adaptive capacity.

#### **4.3.1. Background to the City of Johannesburg**

The City of Johannesburg evolved rapidly from a mining camp in the 19<sup>th</sup> century to a global city of 4.4 million people in the 21<sup>st</sup> century (Beavon, 2004). In the second half of the 20<sup>th</sup> century was shaped largely by the apartheid state's segregated and low-density norms for urban areas, which gave privilege to 'white' inhabitants (*ibid.*). The City of Johannesburg stretches from impoverished Orange Farm in the south to the middle class business and suburban node of Midrand in the north (which are approximately 75km apart). It reaches from Edenvale,

bordering Ekurhuleni Metropolitan Municipality, to Roodepoort in the west (CDE, 2002). The city has a predominantly young population (the youthfulness is a reflection of the country's population as a whole) (CoJ, 2012). The total population of the city constitutes 36% of Gauteng Province's population (*ibid.*). Throughout its history, the city experienced significant in-migration. This has contributed to rapid urbanisation and increase of population and as noted in Chapter 2, much of this is manifested in informal settlements (see Figure 4.2 for a map of the city – note that the size of the informal settlements may not be accurately reflected on the map due to data challenges discussed in Chapter 2).

The most unequal cities in the so-called global South and the world as a whole are Johannesburg, East London and Ekurhuleni, with Gini coefficients of 0.71 (UN-Habitat, 2008). Spatially, the City of Johannesburg has a history of being highly divided, based on the fact that the poor were pushed by the apartheid system to marginalised and distant areas (Beavon, 2004; Tomlinson, Beauregard, Bremner, & Mangcu, 2003). Inequality is one of the major challenges of the City of Johannesburg (Beall *et al.*, 2002). The inequality challenge has contributed to a situation where the poor still mainly occupy areas which are overcrowded due to rapid growth with inadequate sanitation, water, housing, waste-removal and electricity services (Beall *et al.*, 2002; Beavon, 2004; Tomlinson *et al.*, 2003). The high unemployment rate (24.5%) poses a further challenge, and 50% of households earn less than R4 000.00 per month (CoJ, 2012). Poverty has been steadily increasing in the City of Johannesburg, especially in informal settlements (CoJ, 2012). The city's informal settlements also have very limited facilities such as schools, libraries and clinics (CoJ, 2012). Due to this, the poor endure the challenge of spending much of their time and incomes commuting to parts of the city that are economically more active, such as Midrand and Randburg (OECD, 2011; Tomlinson *et al.*, 2003). The limited services are to an extent attributed to neglect of certain areas due to political reasons, and that mainly took place during the apartheid era (Tomlinson *et al.*, 2003). Access to services and economic opportunities is important to understanding inequality and how households cope and shape their adaptive capacities in relation to climate change. The challenges

related to limited access to economic opportunities affect household exposure and responses to climate change, a further reason why I chose to locate my study in the two informal settlements in the City of Johannesburg.

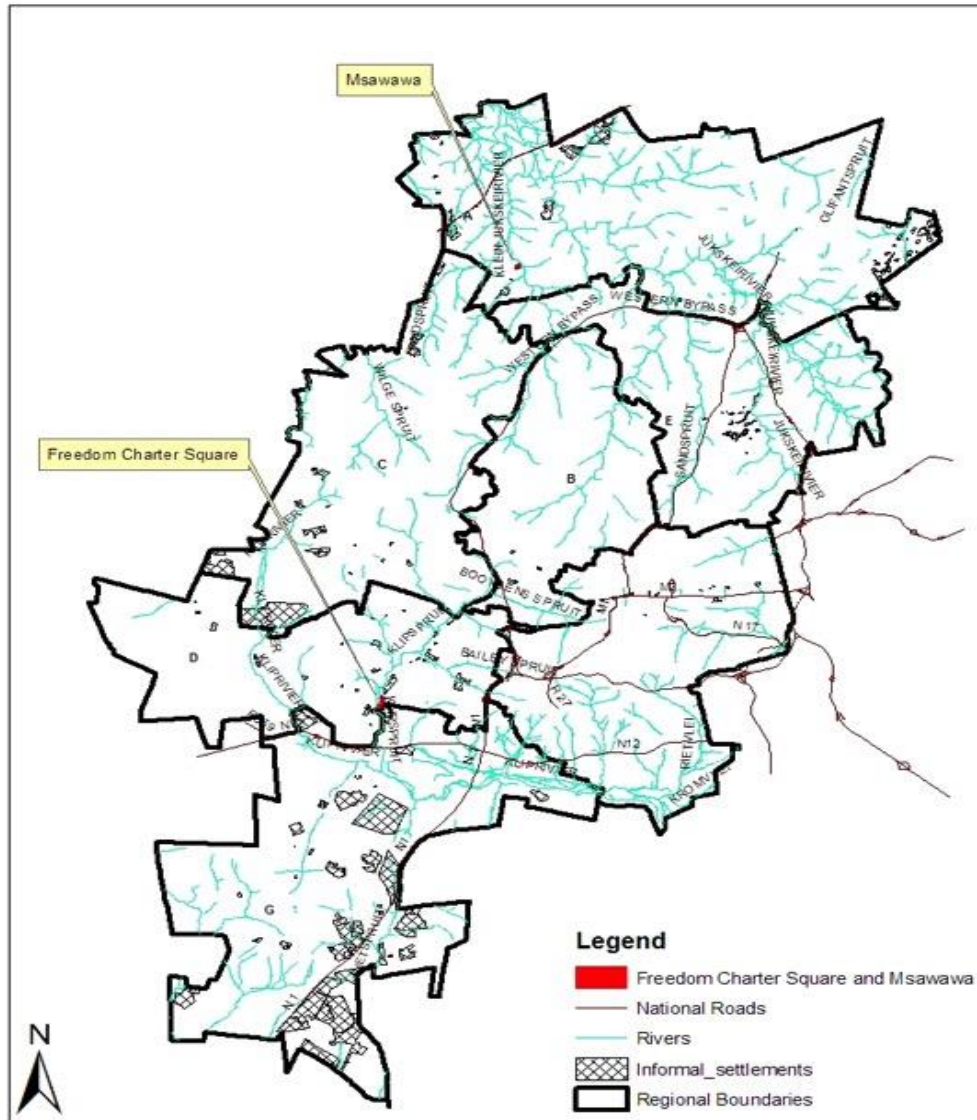


Figure 4.2: Map of the City of Johannesburg (CoJ, 2014a)

The city recognises the fact that climate change is a challenge and that its impacts on communities need to be addressed (CoJ, 2010a), especially in informal settlements (CoJb, 2009). The City of Johannesburg intends to begin addressing climate change through pilot projects. It intends piloting institutional strengthening to enable the implementation of its Adaptation Plan (CoJb, 2009).



As already mentioned in Chapter 1, this study brings to the fore the focus on informal settlements in relation to climate change in the city through the two informal settlements.

#### **4.3.2. Background of Freedom Charter Square**

Freedom Charter Square, also known as ‘Freedom Charter’ or ‘Charter’, is an informal settlement approximately 20 kilometres south-west of the City of Johannesburg (Judin, Roux, & Zack, 2014). It is on the edge of Kliptown, a historic area proclaimed in 1903, which has been incorporated into Soweto (Roux, 2009). Freedom Charter Square informal settlement is located on municipal-owned land (Kuljian, 2009; Noble, 2008) in Ward 53 of the City of Johannesburg’s Region D (CoJ, 2010b) and consists of approximately 2000 shacks (see Figure 4.3 for a view of the physical layout and boundaries of Freedom Charter). The southern part of the city where Freedom Charter Square is located is considered to have lower rainfall, while the northern part where Msawawa (discussed in detail later) is located is considered to have ‘higher rainfall and temperatures and experiences less frost in winter’ (Storie, 2014, p. 40). Freedom Charter Square, unlike Msawawa, has not shown rapid growth over the past decade. Kliptown as a whole is earmarked for an upgrade by the City of Johannesburg before the end of 2016 (Councillor Sibanyoni – Ward Councillor for Freedom Charter, interview, 22 July 2013), but details of these plans and the City’s budgetary commitment to them are very unclear.

There are other informal settlements in Kliptown such as Chicken Farm, First Gate, Johnston Stop, Geel Kamers, Mandelaville, Swaziland, Chris Hani and Tamatievlei (Kuljian, 2007). Furthermore, Kliptown is also known to be a place with a history of neglect related to the limited provision of services by the apartheid government (Noble, 2008). Related to this view of neglect, Kliptown has been noted as a ‘locale teeming of undisciplined practices and trajectories of people, who for all intents and purposes, have been excluded from or by the

regulatory discourses of spatial planning and social administration’ (Bremner, 2008, p. 338). This context of a history of exclusion provided an important angle to understanding social vulnerability in Freedom Charter Square, as discussed in the findings chapters.



Figure 4.3: Freedom Charter Square’s physical layout and boundary in 2012 (CoJ, 2014b).

Freedom Charter Square is separated from the main parts of Soweto through the Klip River and its wetland. Children from the informal settlement going to school in the neighbouring areas such as Dlamini and Tshiawelo (to the west of Freedom Charter, see Figure 4.3 above) cross the Klip River and its surrounding wetland that occasionally floods. Spatially, a section of Freedom Charter Square lies below the 1:50 year flood line (see Figure 4.4) because of its close proximity to the Klip River. The flood line is affecting shacks and some old formal houses that

have been abandoned. As an area that has experienced floods and has the potential to continue doing so, it was chosen for this study because it can provide some basis to understand how the households have been spatially exposed to rainfall variability and how they are responding to it – and what affects that response (drivers of vulnerability and adaptive capacity).



Figure 4.4: Map of Freedom Charter Square showing the flood lines (CoJ, 2014b)

Kliptown is a place with various socio-economic challenges that can affect how households cope and adapt to climate change, and they are also mirrored in the Freedom Charter Square informal settlement. These challenges include unemployment, geographical location, service delivery and limited economic opportunities (Kuljian, 2007). In terms of service delivery, the informal settlement has challenges related to sanitation, water supply, drainage facilities, and waste management (*ibid.*). Furthermore, Freedom Charter Square, including Kliptown

as a whole, has no clinic and schools (Councillor Sibanyoni, interview, 22 July 2013). Access to electricity is a major challenge in Freedom Charter Square. Residents of Freedom Charter Square have been requesting the City to provide them with electricity, however the City states it is unable to deliver on this because the area is informal (Councillor Sibanyoni, interview, 22 July 2013). Households have resorted to illegal means of accessing electricity using the railway line passing the area as a source (*ibid.*). The access to illegal electricity despite the safety challenges causes vulnerability to people and loss of revenue to the City of Johannesburg. Sanitation in Freedom Charter is also a challenge and residents rely on chemical toilets. Some of these challenges replicate themselves in Msawawa, which was chosen to complement Freedom Charter, as discussed next.

#### **4.3.3. Background of Msawawa**

Msawawa is located on a relatively small piece of land near the upmarket suburbs of Randburg, Dainfern and Fourways. The settlement was established much more recently than Freedom Charter Square in 1999/2000, expanding from informal renting in an existing farmhouse. The former small holding is owned by Mr. Deon Delport (Phalanndwa (local community leader in Msawawa), interview, 24 May 2013). There have been continuous court battles resisting the landowner's attempts at removing the settlement (*ibid.*). The City stated to the community leadership that it cannot provide the needed services because the land is privately owned (*ibid.*). This is the reason given as to why Msawawa is earmarked for relocation to a new development that will take place in Lion Park, Randburg, approximately fifteen kilometres away. It is not known when this would take place as various promised dates have passed (*ibid.*).

Msawawa is located in Ward 94 of the City of Johannesburg's Region A (CoJ, 2010a). The settlement grew exponentially (see Figure 4.5, 4.6 and 4.7 for a view of the physical state). According to data obtained from the local community

leadership (which I accepted as realistic), the settlement began with approximately fifteen shacks in 2000 to 501 shacks counted in 2004/05 (Phalanndwa, interview, 24 May 2013). The shack numbers increased to 2153 during the 2008/09 count undertaken by the local community. This figure varies considerably with the estimate of approximately 1500 shacks in 2010 made by the City. The number was estimated to be approximately eight thousands in 2013 (while this seems to be an unrealistic figure, aerial photos do show a rapid growth) (Mafokwane, interview, 25 May 2014). The unreliability of the data confirms a tendency mentioned in the literature review in Chapter 2. However, the rapid growth of Msawawa is a manifestation related to the influx of poor households, both South Africans and people from beyond South Africa's borders. The settlement attracted growth due to factors that include the opportunities of low paid jobs in the suburbs such as Dainfern, Randburg and Fourways. There is an undersupply of low-income housing in the area, with little alternative to living in an informal settlement (*ibid.*). Some of the households in Msawawa from across South Africa's borders were displaced from other areas such as Zandspruit, Alexandra and Soweto during the xenophobic attacks in 2008. They settled in Msawawa because it was relatively peaceful at the time (*ibid.*). The settlement is densely developed and it cannot grow outside the fixed boundaries of the erstwhile small holding due to the walled nature of adjacent development on one side, and a river and a road on two other sides. The settlement could not grow to the existing vacant land on the western and southern side because it is privately owned and the owners are continuously monitoring any form of invasion (*ibid.*).





Figure 4.5: Msawawa's physical layout in 2003 (CoJ, 2014c)



Figure 4.6: Msawawa's physical layout in 2006 (CoJ, 2014c)





Figure 4.7: Msawawa's physical layout in 2012 (CoJ, 2014c)

Msawawa is located on a relatively steep slope as opposed to Freedom Charter Square. As a result, only a small section of Msawawa is located below the 1:50 year flood line (see Figure 4.8) – the Jukskei River borders the settlement to the east. This area occasionally floods but mainly affects the households residing below the flood line shown in Figure 4.8 below. Comparatively, the flooding risk for Msawawa may be considered lower than in Freedom Charter Square because of the steep slope. However, the fact that parts of this settlement experience occasional flooding also provides the opportunity to study the interplay between climate change and informal settlements, through the lives of household members. The stormwater situation (several gullies having formed on the steep slope) combined with the prevailing socio-economic conditions outlined below and the rapid growth also provides the rationale for the choice of this study area.



Figure 4.8: Map of Msawawa showing the flood line in red and the routes that act as a form of drainage in the settlement, those closer to the river being eroded into gullies (CoJ, 2014c)

The socio-economic challenges in Msawawa include poverty, unemployment and lack of facilities such as schools (Phalanndwa, interview, 24 May 2013). Msawawa is adjacent to a government clinic that operates once a week (Phalanndwa, interview, 24 May 2013). The nearest schools are in Randburg and Fourways and they are accessed mainly through public transport. In terms of service delivery, challenges include waste management, sanitation, electricity and water supply. Msawawa does not have illegal electricity connections, which are common in Freedom Charter Square, and people mainly depend on wood (leading to destruction of trees in the vicinity), paraffin, plastic and coal as sources of energy (Councillor Mafokwane, interview, 25 May 2013). Notably, according to the City of Johannesburg, Msawawa has seven communal taps, 450 VIP toilets, 20 chemical toilets and waste collection services scheduled once a week



(Vermeulen, personal communication, 2013). Some of the VIP toilets can no longer be desludged because residents have built shacks in such a way that access by conventional tankers is impossible. Water is accessed through communal taps that constantly require maintenance (Phalanndwa, interview, 24 May 2013). Residents in Msawawa also rely on pit latrines and open veldt sanitation (*ibid.*) The limited services supplied to the community have strained relationships between the community and the City of Johannesburg, leading to occasional protests (Mafokwane, interview, 25 May 2014). The prevailing socio-economic and biophysical context in Msawawa provides the basis for understanding social vulnerability and household adaptive capacity.

#### **4.4. Ethical considerations**

According to Thomas (2004, p. 90) '[e]thics are moral principles that are intended to guide a person's behaviour in society'. This means that the researcher needs to avoid approaches such as forcing respondents to answer questions, deception of participants or gaining access to an organisation without formal permission. Privacy of respondents must always be given respect (Welman, Kruger, & Mitchell, 2005). The researcher needs to be conscious of the fact that ethical issues must be considered throughout the process of conducting the study. Research has the opportunity to create an intrusion into the respondents' lives and this can be in terms of time spent to complete a questionnaire, and sharing of sensitive and confidential information. This makes considering ethical issues vital when designing the study and before engaging the respondents (Cohen, Manion, Morrison, & Morrison, 2007, p. 19). In particular, it is important to consider ethics before conducting the study especially in places such as the two informal settlements where the residents are vulnerable communities (*ibid.*).

The following ethical considerations were relevant to this study and were central to shaping my research approach and to identifying potential challenges or dilemmas so that I could address them in advance:

- Voluntary participation, and ability to withdraw participation when necessary;
- Written consent from relevant authorities and respondents (key informant interviews) (see Appendix A for approval letter from the City of Johannesburg), and protection of the anonymity of respondents by ensuring that the names of respondents are not written on questionnaires and notes;
- Confidentiality of data and information from participants by ensuring raw data is not made available to others and/or for purposes beyond those communicated to the respondents;
- Information to participants on the purpose of the study and the avoidance of embarrassing questions; and
- Respect for the privacy of respondents by not forcing them to participate in the interviews against their will.

(Cohen et al., 2007; Creswell, 2009; Saunders, Lewis, & Thornhill, 1997; Thomas, 2004).

An application for *Clearance of Research Involving Human Subjects* was submitted to the Human Research Ethics Committee at the University of the Witwatersrand with the aim of ensuring compliance and getting more understanding of the implications of my study on households in the two settlements. The application was approved on 27 November 2012 (Protocol Number is H120902) (see Appendix B). The application process included the submission of the survey questionnaire, themes for semi-structured interviews, consent forms for key-informant respondents and background information sheet done in Zulu and English. My research was undertaken with the understanding that I must build trust with respondents, promote fairness and ensure that dignity is maintained. I also focused on agreed questions outlined in the survey questionnaires and themes for key-informant interviews in order to be consistent and fair to all respondents. Written consent was obtained for recording interviews with all key-informants (city officials and community leaders).

#### **4.5. Positionality and bias**

In this study, I identified ways in which to address positionality and bias challenges. My position as a person that can be considered to be from the ‘black’ middle class has some impact on the respondents in an informal settlement that are mainly inhabited by poor households. I managed to overcome this challenge by ensuring that I did not bring my personal status to any discussions with my respondents. However, in some instances I had to indicate to some respondents that at some point in time I also had stayed in an informal settlement in Alexandra, Johannesburg. This was done as a way of building trust. Additionally, I recognised that I cannot control perceptions on the part of the respondents.

When interviewing people the challenge of being subjective and biased may arise, because this is inherently the nature of human beings. The causes are: biased sampling, poor rapport between interviewee and interviewer, subtle changes to question wording, biased probing, alterations to the sequence of questions, selective and interpretive recording of data and poor handling of difficult interviews (Babbie, 2007; Kumar, 2005; Robson, 2011). The other sources of bias are the ‘interviewer, characteristics of the respondent and the substantive content of the questions’ (Cohen, Manion, & Morrison, 2000, p. 121). During data gathering, bias was avoided by ensuring that the respondents felt a sense of neutrality on the issues being discussed. Another way of avoiding bias in this study was to ensure that interviews were restricted to the same format and sequence of words where necessary to ensure consistency.

Language bias was addressed by ensuring that data gatherers (the two field workers) that I hired were trained in completing the survey questionnaire appropriately and that they could use local languages to interpret the questionnaires. The one assistant was Mr. Rodrick Mudimba, who had a good understanding of English, Zulu, Xhosa, Shona, Ndebele and Tshivenda. The other assistant was Mr. Keen Mangazha, who had a good understanding of English,

Zulu, Xhosa, Shona and Ndebele. Discussions were done with them to understand the translation of the key concepts in the study into local languages, and this included the themes of climate change, vulnerability, coping, adaptive capacity, IDP and LED. Household interviews were conducted in the participants' language of choice. The fieldworkers had some experience in climate change-related studies, having had experience in translating and communicating climate change concepts into local languages.

#### 4.6. Data collection

Primary and secondary data were collected for this study. Creswell (2009) indicates that there are various data collection methods that can be used in research: interviews, observation, questionnaires, and critical incident technique and protocol analysis (see Table 4.2 linking methods used with the sampling method and target respondents). In this study, I used one method for secondary data collection, *viz.*, document analysis. Two methods for primary data collection were used - survey and key-informant interviews (see sections below for more information). The combination of the different data gathering methods (discussed in the following two sections) was appropriate in this study because they enabled me to gather both qualitative and quantitative data that allowed me to have a better understanding of the adaptive capacity of households in informal settlement from different perspectives. The survey enabled me to gather more quantitative information and this was complemented by qualitative information from document review and key-informant interviews (these approaches are explained below).

Table 4.2: Linking methods, sampling and respondents

Method	Sampling	No of respondents	Names of respondents
Qualitative (key-informant respondents)	Purposive sampling	8	<b>Freedom Charter Square:</b> Mr. <b>Isaac Shai</b> (Ward 53, former member of the local Ward)

			<p>Committee),  Councillor <b>Pamela Sibanyoni</b>  (Ward 53,),  Mr. <b>Gene Duiker</b> (Ward 53,  former member of the local Ward  Committee, CEO of Kliprown Our  Trust)</p> <p><b>Msawawa:</b>  <b>Mr. Itani Phalanndwa</b> (Ward 94,  Msawawa, former member of the  local Ward Committee)  Councillor <b>Matome Mafokwane</b>  (Ward 94, <b>Msawawa</b>)</p> <p><b>City of Johannesburg:</b>  Mr. <b>Peter Ahmed</b> (Assistant  Director, Spatial Development  Framework and Growth  Management), Ms. <b>Khensani</b>  <b>Manzini</b> (Manager – Economic  Policy and Planning)  Mr. <b>Mzukisi Gwata</b> (Programme  Manager – Climate Change  Adaptation and Policy) and</p>
Quantitative (survey questionnaire)	Stratified sampling combined with convenience sampling	200 households	135 respondents were in Freedom Charter 65 respondents were in Msawawa

#### **4.6.1. Primary data collection**

The fieldwork for collecting primary data was comprised of two phases discussed in detail below. Primary data collection focused on the survey and key-informant interviews. This study focused on getting respondents' views on their vulnerability to extreme weather events in the past ten years. While respondents had to rely on their memories of the extreme weather events over the fairly long period of ten years, this period was necessary to allow for more extreme weather events to be recalled.

##### ***4.6.1.1. Phase One: The survey***

Prior to Phase One of the fieldwork, preparatory work was done that involved visiting Msawawa and Freedom Charter Square to identify local leaders and people who could help in facilitating access to households. This was based on the belief that physical access was going to be difficult for the assistants and myself because we do not reside in the study areas. I had to establish trust, rapport and authentic communication with the respondents through local leaders in each of the two settlements as I relied on these individuals to help with introductions to survey respondents. Mr. Itani Phalanndwa (Msawawa) and Mr. Robert Shai (Freedom Charter Square), provided assistance to the research team by two former members of local committees, since they were familiar with the area and their introduction made access to households easier.

Phase One of the fieldwork focused on the household survey that took place from 2<sup>nd</sup> to 29<sup>th</sup> March 2013. The survey started in Freedom Charter and then proceeded to Msawawa. In Freedom Charter the survey took place from 2 – 18 March 2013 and in Msawawa from 26 – 29 March 2013. This phase involved gathering data using questionnaires. The breakdown of the survey respondents is provided in Table 4.2 above.

As already mentioned, three people, including myself, administered the questionnaires. All three of us kept journals to capture daily experiences. These were used to note observations, unexpected issues being encountered, including how respondents were coping with the questions being asked in the questionnaire, and this also included refusals by potential survey respondents. The challenge encountered was refusals to be interviewed. However, this occurred only in five cases. Those refusing to be interviewed were not expected to explain why they did not want to be interviewed. The other challenge encountered involved one respondent in Freedom Charter who requested assistance in terms of writing letters to various spheres of government on low-cost housing. On the questionnaire, there were no challenges encountered related to the questions that could lead to the adjustment of the methodology and questionnaire. A pilot was conducted in Freedom Charter Square on 11 February 2013 to test the questionnaire that was used in the survey. This helped in identifying areas for improvement in the survey questionnaire (final questionnaire attached as Appendix C).

#### ***4.6.1.2. Phase Two: Key-informant interviews***

In social research, the use of key informant interviews marked a move away from considering people as manipulable and data as something that is considered external to the individual (Cohen et al., 2007). This method is preferred in facilitating flexible conversations that could help in answering the research questions, and with the potential of the emergence of new issues generating knowledge (*ibid.*) This form of interview is also used with the aim of identifying important variables in a particular area (Welman *et al.*, 2005).

Phase Two of the fieldwork involved interviews with key-informants based on thematic areas (see Appendix D). The purpose was to gather insights from city officials, and key local stakeholders/informants. These respondents are listed in Table 4.2 above (reasons for choosing them are outlined in the sampling strategy below). None of the respondents were prior acquaintances of myself. I identified

them through visits to the informal settlements, through the City of Johannesburg website and via fellow PhD students researching related topics. We were able to conduct the interviews during the week and early on Saturday mornings during the weekends.

#### **4.6.2. Secondary data collection**

As indicated, secondary data collection involved the analysing of documents. Documented information remain an important source of ‘social data’ (Drew, Raymond, & Weinberg, 2006, p. 63). Documents may include letters, agendas, proposals, news clippings, articles in mass media, progress reports (Yin, 2009). In case study research, documented information is used to ‘corroborate and augment evidence from others sources’ (*ibid.*:103). For the two case study areas, documents or records that were found in relation to the case study areas as well as the City of Johannesburg as whole were analysed. The study specifically relied on documents that included policies on climate change adaptation, governance, LED, background on informal settlements, IDPs and other plans as well as strategic documents.

#### **4.7. Sampling Strategy: Survey and key informant interviews**

Representative sampling in informal settlements, as required for the quantitative survey in each of my case study areas, is considered complex (Vearey, 2012). The sampling complexities relate to un-managed growth of informal settlements, and different housing types. A related challenge is the fact that the households are not spatially organised in a particular order (they are located irregularly). Informal settlements maps and statistics about informal settlements are mostly inaccurate, due to the on-going and often rapid change these settlements undergo (Huchzermeyer, 2011). These factors were considered when choosing the sampling approach for this study. To deal with these sampling complexities and



still ensure representativity, Vearey (2012) suggested the use of cluster-based random sampling, community engagement and mapping<sup>6</sup>.

Simple random sampling was initially considered but it could not be applied due to the fact that a sampling frame could not be drawn. On the household survey, it became evident that it would be time consuming and expensive to attempt to draw up a detailed sampling frame that could be used for identifying exact households. This was constrained by the unavailability of up to date aerial photographs for the two settlements that could be used for numbering households. Further complications were the population density and the fact that shacks are not arranged in any linear pattern. In consideration of these facts, the approach in part was to identify willing households and target them for the survey. This approach in which the researcher relies on available respondents is categorised as convenience sampling (Babbie, 2011).

The study combined convenience and stratified sampling together to complement each other (outlined in Figure 4.2 above). To ensure some representativeness, an equal amount of households were surveyed in the stratified grids (geographically) and a spread of respondents in the grid (see Appendix E for the one used in Freedom Charter) was also maintained. Stratified sampling was used to divide the informal settlements geographically into sections/grids that were targeted for the survey. This helped to avoid reaching one household more than once. The two hundred target households were proportionally distributed between the two informal settlements based on 1000m<sup>2</sup> sampling grids done on aerial photographs obtained from the City of Johannesburg. Respondents were proportionally divided between the two settlements based on the grids. The respondents were kept anonymous, and they all gave their verbal consent. The assistance by local people in identifying respondents on this basis helped in building trust and ease of access to households.

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<sup>6</sup> Vearey made valuable inputs into the methodology in her capacity as a member of the Wits University Ethics Committee.

As outlined in Figure 4.2 above, sampling for key-informant interviews was purposive. Judgemental/purposive sampling was used to select key people who are knowledgeable on climate change adaptation activities, LED and spatial planning in the City of Johannesburg. These officials have a good understanding of City policies, which could help in understanding household adaptive capacity. Key-informants in Msawawa and Freedom Charter were chosen based on the fact that they occupy/used to occupy leadership positions in the local community.

#### **4.8. Data coding, analysis and interpretation**

As already mentioned, the study obtained both qualitative and quantitative data that were gathered through the use of document analysis, survey and key-informant interviews. In particular, large amount of data were gathered using the questionnaire. The SPSS programme was used for coding (making the data numerical – converting into codes), capturing and analysing quantitative data. I appointed two student assistants for data capturing who had done similar work in the past. They also had a background in Statistics. The data capturing process took approximately a month between April and May 2013. The results of the survey data are presented using diagrams, graphs, tables and charts in order to help build arguments or explanations.

Qualitative analysis is a method of examining social research data and interpreting observations without having to convert into numerical form, and this consists of reassembling and segmenting data in view of the problem statement (Boeije, 2010). This type of analysis aims to discover patterns (thick descriptions) and links between variables (*ibid.*). In qualitative analysis, data is prepared for analysis through concept mapping, memoing and coding (*ibid.*). After conducting the qualitative interviews, I transcribed the recordings. Descriptive responses captured during the transcribing process underwent content analysis by hand, identifying emerging patterns and themes from the data. The results of key informant interviews are presented mainly using selected quotations obtained from interviews, thereby also giving a voice to the respondents in this study.

#### **4.9. Conclusion**

This chapter provided an overview of the conceptual framework that has evolved out of the literature review. The conceptual framework provided the outline for analysis of the study's findings in subsequent chapters. Furthermore, the chapter outlined the study area focusing on the spatial layout, socio-economic context and history of the City of Johannesburg where the two case studies are located. The socio-economic and spatial contexts discussed here lay a foundation for the discussion on household exposure and sensitivity to climate change in Chapter 5, focusing on the two case studies.

As outlined, the study also underwent a rigorous ethics clearance. This was strengthened through the triangulation method adopted in the study that involved mixing both qualitative and quantitative methods. Triangulation was further strengthened by gathering data through three different methods, *viz.*, document analysis, survey and key-informant interviews. These methods complemented each other to improve reliability and validity of this study. They also helped in gathering data that has led to the formulation of substantive findings outlined in subsequent chapters on households' exposure and responses to climate change in Freedom Charter Square and Msawawa.

The chapter provided the methodological tools applied in line with the conceptual framework. As already mentioned, the study follows a case study approach combined with mixed methods in sampling and data gathering. Combinations of both primary and secondary data were collected to understand household adaptive capacity in the two settlements. The data laid the basis for the empirical insights of the study provided in the following Chapters: 5, 6 and 7. These chapters build on the conceptual and methodological foundations of this study laid in this chapter.

**5. CHAPTER FIVE: THE EFFECTS OF CLIMATE CHANGE ON HOUSEHOLDS IN FREEDOM CHARTER SQUARE AND MSAWAWA**

## 5.1. Introduction

As already noted, this study draws on the social vulnerability school of thought in which people are considered central to the issue of vulnerability. In certain contexts they are considered the creators of their own or others' vulnerability through power relations that include the functioning of political and economic systems (Cannon, 2008). In line with this school of thought it is premised that vulnerability to increased frequency and severity of extreme weather events already exists in Msawawa and Freedom Charter Square (referred to as Freedom Charter) by virtue of the internal characteristics of the settlements' households. In view of this, the chapter provides findings on the nature of the demographics looking at the socio-economic characteristics to understand relative household vulnerability to climate change. The characteristics assessed in this chapter are, household size, health, assets, income and economic activity. These can be grouped as human capital, physical capital and financial capital. The discussion on these socio-economic factors lays the foundation for further discussions related to household exposure to extreme weather explained below.

As outlined in Chapter 3, vulnerability is an outcome of exposure, sensitivity and adaptive capacity (IPCC, 2007c). This chapter provides findings drawn from the survey and key-informant interviews on household exposure to extreme weather events that are related to climate change, and the drivers of vulnerability that affect how those events were experienced. The weather events discussed in this chapter are strong winds, extreme cold and heat in addition to weather events related to rainfall or lack of it, namely heavy downpours, hailstorms, floods and drought. The findings also assess household exposure to fire disasters that could be linked to extreme cold. Therefore, exposure to fire is related to the resultant use of forms of heating with open flames when it is extremely cold. Additionally, the chapter points out the degree to which the households in the two settlements are affected by climate change as a result of a combination of external factors (*i.e.*,

extreme weather events) and socio-economic characteristics – *i.e.*, providing an insight into the factors that make a household more or less vulnerable.

This results chapter focuses on the first objective of this study and its related sub-questions outlined in Chapter 1. These are restated below:

- ✓ To assess ways in which households in informal settlements in the City of Johannesburg have been affected by climate change.

Sub-questions within this objective were:

- To what extent do socio-economic factors determine the extent to which households are affected by climate change?
- In what ways have households in informal settlements in the City of Johannesburg been exposed to climate change?

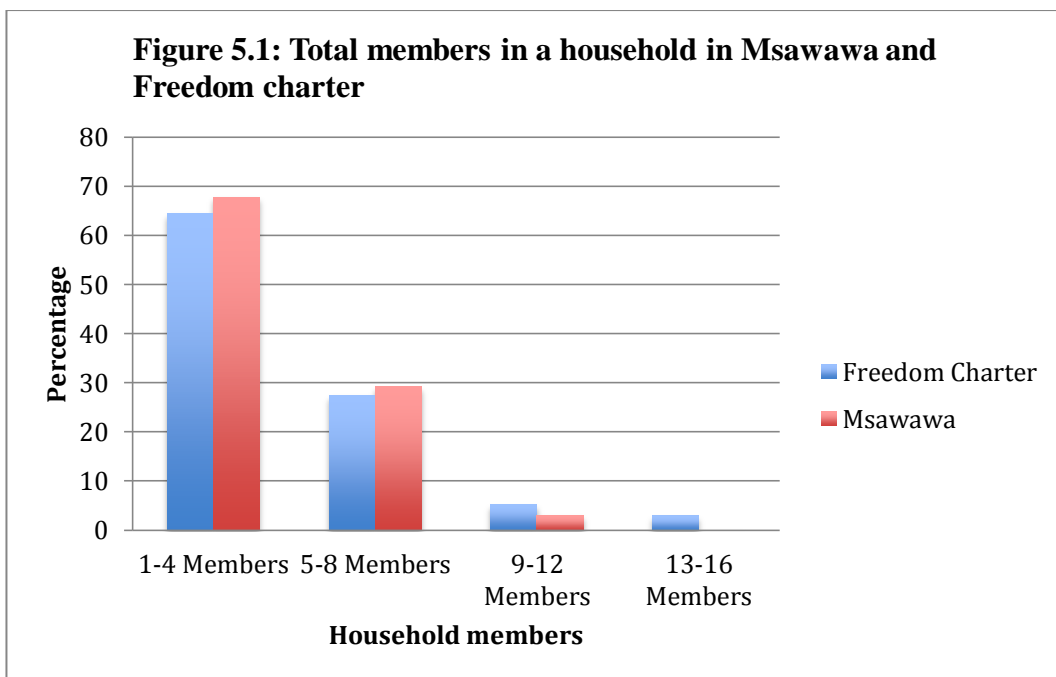
## **5.2. The role of household socio-economic status on household vulnerability in Freedom Charter and Msawawa**

The demographic composition of Msawawa and Freedom Charter differs in terms of household size, health, income and access to economic opportunities. As pointed out in the literature review, demographic issues, which are social in nature, play a significant role in household vulnerability (Pelling, 2003). The characteristics of social systems such as household composition, social support, size and gender, shape the exposure of households to climate change (*ibid.*).

### **5.2.1. Household size**

Household sizes in the two settlements vary. The survey findings revealed that 64% (Freedom Charter) and 68% (Msawawa) of the respondents in the two settlements have between 1-4 total household members (See Figure 5.1.). An average of 34% of the households surveyed in the two settlements had more than

four household members. This view was supported by Babugura (2005) who highlighted that household size impacts various facets of life that include access to economic opportunities, space, and the amount of food needed for sustaining members. It has been indicated that in some instances, households reduce members during extreme events through temporary migration to places such as urban areas, proving that household size matters as indicated by Ellis (2000). It has also been noted that single-parent households and families with more dependents usually have limited resources for looking after dependents and this affects adjusting to and recovering from the impacts of climate change (Blaikie et al., 1994; Cutter, 2003). As pointed out in the 2011 Census, the average household size in South Africa is composed of an average of 3.6 members (see Figure 5.1. for total members in a household in Msawawa and Freedom Charter) (ECSECC, 2013). Relatively larger households in South African terms have more than four members. A higher household size may imply the need for more resources such as finance to survive (Babugura, 2005).



### 5.2.2. Health status

Households in Msawawa and Freedom Charter have members that are suffering from various diseases (See Table 5.1.). The findings revealed that a considerable number of households in these two settlements have members suffering from low and high blood pressure, heart problems, sugar diabetes, HIV&AIDS and TB. As shown in Table 5.1, Freedom Charter has more people suffering from high/low blood pressure as compared to Msawawa. A considerable number of households in the two settlements have sick members, and as Tabi (2013) pointed out these type of households can be considered relatively more vulnerable to climate change because of time and resources spent on looking after the sick. Heart problems, sugar diabetes and HIV&AIDS also affect households in Msawawa and Freedom Charter. The survey results in the table below also show that Freedom Charter has more households facing health challenges such as depression, alcohol abuse, heart problems, HIV&AIDS<sup>7</sup>, sugar diabetes, drug abuse and Tuberculosis. These findings echo the GCRO (2012) sentiments discussed in the literature review, pointing out that residents of Gauteng feel that HIV&AIDS is the main problem followed by alcohol abuse, drugs, high blood pressure and TB, although they are not logically aligned in terms of percentages.

Table 5.1. The household health challenges in Freedom Charter and Msawawa<sup>8</sup>

<b>Health challenge/Disease</b>	<b>Percentage affected in Freedom Charter</b>	<b>Percentage affected in Msawawa</b>
High/Low blood pressure	36%	20%
Depression	16%	3%
Alcohol abuse	16%	12%
Heart problems	12%	3%
HIV&AIDS	10%	3%
Sugar diabetes	8%	3%

<sup>7</sup> This may not be the real figure because some people still feel that they will be stigmatised if they reveal their HIV&AIDS status.

<sup>8</sup> Note that one member of the household could be affected by more than one health challenge. In that case the totals may add to more than 100%.



Drug abuse	7%	0%
Tuberculosis (TB)	3%	0%

The review in Chapter 2 pointed out that health challenges are a lingering problem in informal settlements and this is attributed to many factors that include the nature of the environment in which households stay, population density and climate change (Shortt & Hammett, 2013). The challenges related to health in Msawawa and Freedom Charter were limited access to health facilities such as clinics and hospitals. As explained in the literature review, Magrath (2010) indicated that such exposure to diseases, substance abuse and having disabled members in the household has an impact on the human capital and how it can cope or build its adaptive capacity. As discussed in the literature review in Chapter 2, this was locally confirmed by Tabi (2013) during the study on climate variability in Enkanini informal settlement in Cape Town. The illnesses identified in households in Enkanini were cold/flu, lung problems (related to burning fuels such as paraffin in winter), blood pressure, tuberculosis (TB) and others, and they were related to households' inability to adapt to climate change (*i.e.*, weak dwellings, no ventilation, *etc.*).

The prevalence of various diseases identified during the household survey among so many households illustrate the unhealthy nature of the settlements caused by limited sanitation, indoor air pollution, lifestyle challenges, grey water flow and overcrowding challenges identified during the literature review (Shortt & Hammett, 2013; UN-Habitat, 2008). Therefore, in this context it is difficult to address the disease challenges faced by households without having to ensure that the biophysical environment is significantly improved to become healthy and habitable (*ibid.*). During the in-depth interviews, Duiker (local community leader) (Mr. Duiker, interview, 23 May 2013) had the following interesting view on the local environment in Freedom Charter:

Obviously there are health hazards...so many families having to share toilets...the water, the grey water that you find flowing down...it is ugly.

Water that is shared by... luckily we don't have pigs in Freedom Charter anymore...but we used to have up to a few years ago... dogs and rats, the way the place is infested...and I am talking about rats almost the size of cats. Your dog eats a rat that has eaten poison...the dog dies in your yard; you know those kinds of things.

### **5.2.3. Household wellbeing<sup>9</sup> in Freedom Charter and Msawawa**

An understanding of household wellbeing is vital in developing a picture how households are positioned to respond to climate change. In terms of wellbeing improvement in the context of climate change for households Freedom Charter and Msawawa, 24% and 14% respectively of the households stated that their wellbeing improved positively in the past ten years (see Table 5.2 for a detailed breakdown). The relatively lower number of who indicated that their wellbeing improved further points to a situation where households are struggling to make ends meet, and their situation shows limited improvement. This compromises their ability to cope with and adapt to climate change. An understanding of household wellbeing is important in developing broader picture of how households are positioned to respond to climate change. This view is supported by Kelly and Adger (2000, p. 326) who explained that, studies looking at the impact of climate change must not only focus on biological, chemical and physical effects, there is a need to make full assessments of 'consequences for human wellbeing'. Thus this could help in understanding how society responds to climate change by deploying measures that promote coping and adaptation (*ibid.*).

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<sup>9</sup> The study did not measure wellbeing, but households were asked to indicate their understanding on wellbeing changes of their members over the years.

Table 5.2: Household perceptions of wellbeing improvement in Freedom Charter and Msawawa

Area of improvement	Freedom Charter	Msawawa
Finance	3.9%	12%
Housing	6.7%	0%
Health	4.4%	0
Education	9%	0
Water access	0%	2%
Total	24%	14%

Crime has been highlighted as a major contributor to harsh living conditions for Households in Freedom Charter and Msawawa. Sixty-two percent of the households in Freedom Charter have been negatively affected by crime, with only one household stating that it relies on the use of crime as a survival mechanism. In Msawawa, almost 59% of the households were negatively affected by crime. Crime has been noted as one of the major challenges affecting households in South Africa (Everatt et al., 2008). The findings here confirm the findings of the Gauteng City Region Observatory (GCRO) 2011 study on quality of life in Gauteng that indicated that the main challenge that households are facing in Johannesburg is crime (GCRO, 2012). This supports the respondents' experiences and belief that crime is high in both Msawawa and Freedom Charter Square. The views here are in line with the findings of the URP ISRDP study that was conducted by Everatt et al. (2008) in both rural and urban nodes that were targeted by the government for development in various provinces which found that crime is the number one problem. The crimes identified by the affected households in Freedom Charter were mainly robbery (89%) and fighting (4%), while in Msawawa it was exclusively robbery (100%). The other identified crime in Freedom Charter with less than one percentage was rape<sup>10</sup>. The high level of crime mentioned by households adds to the already existing challenges that they

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<sup>10</sup> This may not necessarily be a true picture because rape is a sensitive matter and respondents may not have felt comfortable to discuss it.

are dealing with, including diseases, disasters and other socio-economic conditions affecting the quality of life in the two settlements.

#### **5.2.4. The asset base of households in Freedom Charter and Msawawa**

The nature and ownership of physical assets such as dwellings used by households also play a role in how they cope with climate change. Activities such as the renting of houses and being in a location that is dangerous combine to produce some form of social vulnerability (Cutter, 2003). The study findings indicated that 95% of the survey respondents in Freedom Charter as compared to 92% in Msawawa stated that they own the dwellings in which they were residing. Seven per cent of the survey respondents in Freedom Charter compared to 52% in Msawawa said that they own another dwelling elsewhere/outside of the settlement. This could be explained by the fact that Msawawa is a more recent settlement when compared to Freedom Charter, and it is composed of residents who feel that they are in the urban area temporarily. It also means that people in Freedom Charter consider their settlement more of a permanent place of residence. Dwelling ownership can be considered a driver of coping and adaptive capacity, depending on the nature and strength of the dwelling (*ibid.*). The level of ownership shows that if the area was formalised it could create a situation where households could invest in activities that reduce their exposure to climate change. Viewed differently, dwellings can be said to constitute one of the main assets that can help shield households from extreme weather events, and that is why it is considered a key element of adaptive capacity.

The weak nature of dwelling structures, particularly of roofing materials being used by households in Msawawa and Freedom Charter is an important indicator of how vulnerable the households are to climate change. The survey found that the predominant roofing material in Freedom Charter and Msawawa was zinc/corrugated iron which is mainly second hand, followed by zinc combined with plastic (See Table 5.3). Other materials for roofing were those materials for

making tents for roofing and concrete tiles (this is the old farm house where Msawawa started). The use of material such as plastic, old corrugated iron (zinc) and tents, indicates how vulnerable the households are to extreme weather events such as heavy rainfall, extreme heat, extreme cold and fires (discussed later). This further portrays a situation where households are struggling socio-economically to make structures that could reduce their vulnerability to prevailing extreme weather events. The findings here concur with the fact discussed in the literature review that normally households in informal settlements mainly reside in weak dwelling structures that do not conform to building codes, made of local building material, designs and skills (Fekade, 2000). The nature of the structures/assets show that households are vulnerable to climate change as indicated by Alinovi et al. (2009). This situation also explains why some households indicated during the survey that they feel that ownership of low-cost housing could help them adapt to climate change.

Table 5.3: Predominant dwelling roofing material in Freedom Charter and Msawawa

Name of Area		Percent
<b>Freedom Charter Square</b>	Zinc	99.3
	Tiles	0
	Zinc and plastic	.7
	Tent material	0
	<b>Total</b>	<b>100.0</b>
<b>Msawawa</b>	Zinc	63.1
	Tiles	1.5
	Zinc and plastic	24.6
	Tent material	10.8
	<b>Total</b>	<b>100.0</b>

Dwellings in informal settlements are made of various walling materials that are not durable to withstand extreme weather events (See Table 5.4). The survey findings showed that most of the dwellings (in terms of walls) in the two settlements were mainly made of zinc/corrugated iron. These were followed by bricks and those made of wood and boards (mainly found in Msawawa). A small

fraction of dwelling walls used plastic material, and this were also mainly in Msawawa. The fact that Msawawa had weaker dwellings may be attributed to the fact that it is a recent settlement compared to Freedom Charter. Further, its location on private land may contribute to the reluctance of households to invest in better structures for fear of relocation. In the two settlements the majority of the households used materials that were not safe or good in responding to an increase and intensity in hot or cold weather patterns. This further confirms that a considerable proportion of the households are residing in unsafe dwellings. The 36% households with brick walling in Freedom Charter listed in Table 5.4 below are not necessarily well off as compared to the others because the houses in Freedom Charter made of bricks are predominantly in a state of disintegration (see Figure 5.2 for an example of a house that is being used by a family). The people in Msawawa predominantly reside in shacks made of various materials such as wood, zinc, plastic, boards and tent materials.

Table 5.4: Dwelling wall structures in Freedom Charter and Msawawa

<b>Name of Area</b>		<b>Percent</b>
<b>Freedom Charter Square</b>	Brick	36.3
	Zinc/Corrugated iron	60.7
	Plastic	.7
	Other: Wood or board	2.2
	<b>Total</b>	<b>100.0</b>
<b>Msawawa</b>	Brick	16.9
	Zinc/Corrugated iron	30.8
	Plastic	3.1
	Other: Wood or board	49.2
	<b>Total</b>	<b>100.0</b>



Figure 5.2: A collapsing house near the Klip River in Freedom Charter (Source: Mpho Nenweli, March 2013) (A part of this house was occupied at the time of my fieldwork)

Fewer households in the two settlements owned assets in the form of domestic animals. Thirteen per cent of the households in Freedom Charter compared to eight per cent in Msawawa indicated that they own domestic animals such as goats and pigs. This can be partly attributed to challenges of access to space for habitation and agricultural use in the two settlements. As pointed out in the literature, assets such as domestic animals play an important role on how households cope with or adapt to climate change (Cutter, 2003). Having limited assets to an extent contributes to increased household exposure and vulnerability to climate change, and adaptive capacity (Chishakwe et al., 2012). However, the presence of households with these animals shows that there is, to a limited extent, an interest in urban farming that could help households to generate income. This perspective was confirmed by the Ward Councillor for Freedom Charter (Councillor Sibanyoni, interview, 22 July 2013) who interestingly related this story during the in-depth interview:

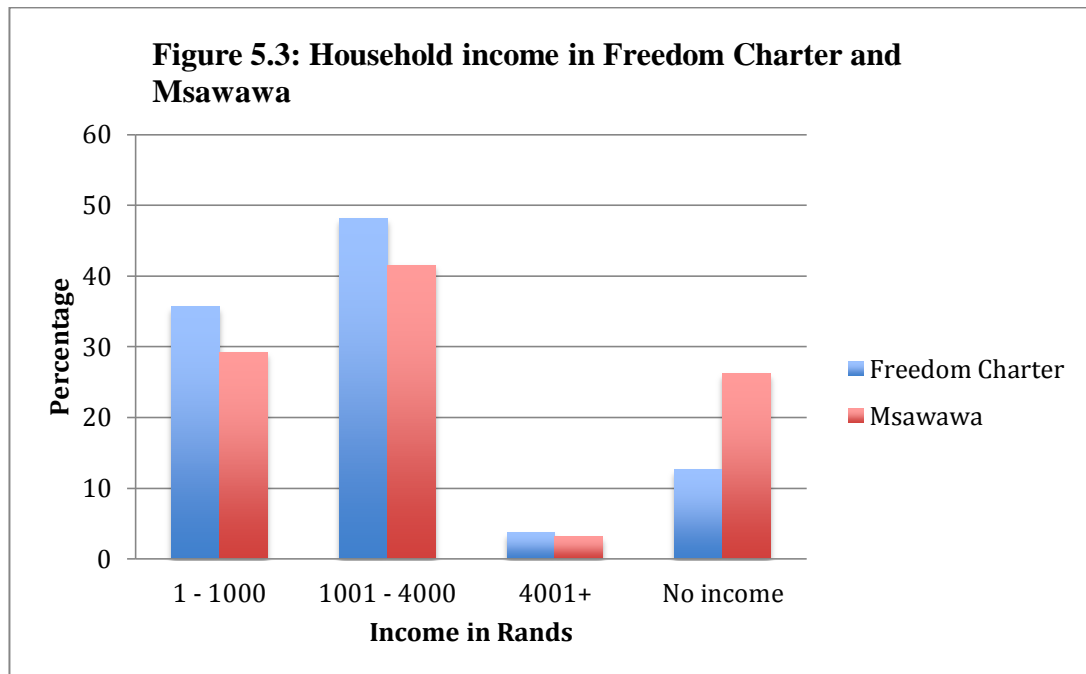
Around last year pigs were confiscated from a group of people breeding them in Kliptown. Their pigs were taken by the Society for the Prevention of Cruelty to Animals (SPCA) and they did an assessment and found that they had dangerous diseases, even for people staying around.

#### **5.2.5. Household access to income and economic activity**

The survey found that sources of income in the households were formal employment, ownership of businesses and social grants (see Figure 5.3 for household income expressed in rands). Figure 5.3 shows that most of the households earn between R1.00 - R4,000.00. Households with members getting no income in Freedom Charter and Msawawa were 13% and 26% respectively. As discussed in the literature review in Chapter 2, limited income opportunities, to an extent, could affect how households are exposed to extreme weather events. It is also important to restate that lower income and poverty does not necessarily equate to vulnerability to climate change (Few, 2003). Out of the households in Freedom Charter who have an income, 24% had members with some form of employment, 18% had a business and the rest relied on social grants (discussed in detail in Chapter 6). In Msawawa, 33% of those with income had members with some form of employment, 31% had businesses and the rest relied on grants. Less than half of the households both in Freedom Charter and Msawawa had people who had formal employment and this indicates that unemployment is a challenge. The findings prove to a certain extent that the two informal settlements have relatively higher unemployment compared to City of Johannesburg which is considered by the OECD (2011) to have an unemployment rate just above 20%. These findings were also corroborated by Sibanyoni (Councillor Sibanyoni, interview, 22 July 2013) who expressed the view that in Freedom Charter youth unemployment is considerable. She further illustrated this by saying that, ‘if we can go there [Freedom Charter] now and call a public meeting the hall will be full and it tells you that people are not working; even if it is during the week’. The UNFPA (2007) also noted the high unemployment levels of both youth in



informal settlements, which is a similar situation in Msawawa and Freedom Charter.



The literature review pointed out that natural capital and financial capital form part of resources that help in shaping household adaptive capacity, and institutions also influence the assets that can be obtained to build adaptive capacity (Williamson et al., 2010). As reviewed in Chapter 2, Panda, Sharma, Ninan, and Patt (2013) note that, in some instances, households with lower incomes are the ones that are relatively more vulnerable to change including those that are related to climate. As explained in Chapter 3, the study by Tabi (2013) on climate variability in Enkanini informal settlement in Khayelitsha found that households in informal settlements struggle to adapt to climate variability and change due to economic constraints and inadequate infrastructure. Income enables households, in some instances, to invest in the construction of dwellings and education, which can help in reducing vulnerability. As pointed out in Chapter 2, access to income does not necessarily guarantee the ability of the household to invest the resources in activities that reduce vulnerability.

Lack of skills has made it difficult for households to access opportunities in the City of Johannesburg. Mafokwane (Councillor Mafokwane, interview, 25 May 2013) and Phalanndwa (Mr. Phalanndwa, interview, 24 May 2013) expressed the view that the majority of people in Msawawa and Freedom Charter have limited skills and they mainly do jobs such as domestic work and offering labour in the construction sector (this study did not assess this issue). The skills limitation makes it difficult for members of households in the two settlements to access economic opportunities created by the business sector, the City of Johannesburg and the government at large. The lack of schooling infrastructure in the informal settlements creates some form of unequal access to education, making some households deprived of the opportunities needed to have their members build their skills, which can play an important part in the activities they can pursue in the economy. This in turn affects the socio-economic status of such households, making them socially vulnerable (Cutter & Finch, 2008). Households with higher education levels tend to have access to better income opportunities and they also have higher adaptation capacities (Panda et al., 2013). Higher levels of household income in the City of Johannesburg are significantly linked with the post-matric education of members showing that education and skills are key (GCRO, 2012).

Contrary to this picture of lack of skills in places such as Msawawa and Freedom Charter is the fact highlighted by Beall *et al.* (2002) that Gauteng, where the two settlements are located, has the greatest number of most skilled workers in South Africa. Skills play an important role in access to better opportunities that can enable households to have relatively good resources that can be key to recovery when they are exposed to strong winds and floods (Cutter, 2003). The disparities in skills, to an extent, reflect the inequality in access to infrastructure such as schools, libraries and early childhood development centres in the City of Johannesburg. Informal settlements are indeed not only places of inequality but they are symbols of exclusion, showing the failures of city planners to respond to the poor's right to the city (Kulabako et al., 2010).

A notable number of households in Msawawa and Freedom Charter had no members who are economically active. The survey also revealed that more households in Freedom Charter (27%) compared to Msawawa (13%) have between 1-4 members who are economically active. There are less than half of the households in the two settlements who have members who are economically active, whilst above 50% of households have no members that are active. As explained by Madzwamuse (2010), poor resource access and weak economies (reducing economic activity) limit household coping and adaptive capacity in relation to climate change. As Chishakwe et al. (2012) explained, the households with no members who are economically active are relatively in difficult circumstances because access to financial resources play a significant role in coping and building adaptive capacity. The City of Johannesburg also accepted that deprivation of resources (including financial) to the poor communities in informal settlements increases their vulnerability to climate change challenges such as floods (CoJ, 2010a). Notably, the findings also showed that the number of households with economically active members is relatively low despite the fact that the two settlements are located in Gauteng Province, which is the wealthiest province in South Africa (OECD, 2011). In this context there is no direct relationship between the wealth of the province and the economic conditions of households in Msawawa and Freedom Charter.

Unemployment is a key challenge in the City of Johannesburg (CoJ, 2010a). The OECD (2011) also alludes to this challenge of unemployment in the City, which was observed by the GCRO (2012) to be around 34% as discussed earlier in the literature review. Unemployment impacts negatively on access to resources causing households in some cases to reside in weak dwellings that are exposed to extreme weather events such as strong winds. The Ward Councillor for Msawawa estimates (just a view) the unemployment rate to be approximately 70% or higher (already noted above) and he notes that this is seen when there are public meetings, because the attendance is always high even during the week (Councillor Mafokwane, interview, 25 May 2013), as is the case in Freedom Charter (Councillor Sibanyoni, interview, 22 July 2013). Although this is not based on a

scientific assessment, it indicates the perceptions that the two councillors have on unemployment. The Ward Councillor for Msawawa further mentioned that when there is a call for people to apply for Expanded Public Works Programme (EPWP)<sup>11</sup> jobs, the level of applications is more than a thousand (Councillor Mafokwane, interview, 25 May 2013). The challenge is that because matric is required, they only manage to get less than a hundred people in most instances. This means that a large proportion of people in Msawawa do not have matric, showing the low level of education in the households. This situation is due to the fact in some instances that: '[e]ducation remains a luxury for the urban poor in the face of current crises' (UN-Habitat, 2010, p. xv). The survey findings on unemployment in Msawawa and Freedom Charter mirror that of the City of Johannesburg. This challenge is influenced by limited access to economic opportunities by households (Woolard, 2002) and it contributes to the challenge of household adaptation deficits (Williamson et al., 2010). As explained by Pelling and High (2005), households with no access to employment opportunities are relatively poorer and they have lower adaptive capacity because of their limited access to livelihood sources. This notion points to an understanding that Msawawa is relatively vulnerable to climate change compared to Freedom Charter because it has relatively fewer households with members that are economically active, although this can change when other parameters are considered. Households with limited access to economic opportunities tend to be poorer and they resort mainly to coping mechanisms with limited chances of building adaptive capacity (Madzwamuse, 2010).

The overall picture that the socio-economic and demographic data from the survey show that both Msawawa and Freedom Charter have a significant number of households that have sizes (members) that are above the national average (these households are an average of 34% in the two settlements). On health, households in Freedom Charter had more members suffering from an array of diseases (as shown in Table 5.1) compared to Msawawa. Income and economic activity in the

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<sup>11</sup> This is a government-funded programme that provides short-term employment opportunities and training to local communities, targeting mainly youth, persons with disability and women.

two settlements are also low. Freedom Charter (27%) has relatively more households with economically active members compared to Msawawa (13%). The socio-economic characteristics discussed here already show the complex and interconnected factors that contribute to household vulnerability (discussed in detail below).

### **5.3. Household exposure to extreme weather events in Msawawa and Freedom Charter**

The impact of increased frequency and intensity of extreme weather events (*i.e.*, wind, heat, cold, different forms of precipitation and drought) varies depending on a combination of factors such as household access to income, sex of the household head<sup>12</sup> and nature of dwellings that households have. Exposure to fire is more linked to the factors such as the duration the household has been residing in the settlement and marital status. Broadly, the findings in the two settlements discussed in detail below indicate that in the two settlements households are more vulnerable to extreme cold (78%), compared to extreme heat (75%), strong wind (44%) and fire (17%). This new insight emanated from the empirical findings and is not related to the literature review conducted.

#### **5.3.1. Household exposure and impacts of strong winds**

Increased frequency and intensity of strong winds have become part of the informal settlement fabric and it leads to various challenges such as the destruction of dwellings. During the in-depth interview with Sibanyoni (Councillor Sibanyoni interview, 22 July 2013), she further states that the negative impacts (discussed below) of strong winds occur mainly around spring and summer (related to heavy rainfalls). Approximately 33% of Freedom Charter and 54% of Msawawa households surveyed indicated that they have been affected

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<sup>12</sup> The survey for this study focused on the following male-headed households, 55% in Freedom Charter and 77% in Msawawa. The female headed households were 45% in Freedom Charter and 23% in Msawawa.

negatively (*i.e.*, damage to dwellings) by strong winds in the past ten years. The impacts on households resulting from strong winds were the destruction of dwellings, personal belongings and injury of household members (responses to these impacts are outlined in chapter 6). The findings showed that households with zinc roof materials on their dwellings (predominantly found in Freedom Charter) are more vulnerable to strong winds than those with other types of material. The percentage of these households affected by strong winds with zinc roofing is 100% in Freedom Charter and 54% in Msawawa. Therefore, in Freedom Charter all households affected by strong winds had zinc roofing, while in Msawawa some had zinc combined with plastic. In Msawawa there were also those with tiled roofs<sup>13</sup> and tent roofing (see Table 5.4).

Table 5.5: Roofing material of households affected by strong winds

Roofing Material	Freedom Charter	Msawawa
Corrugated iron/Zinc	100%	54%
Corrugated iron and plastic	0%	29%
Tent material	0%	14%
Tiles	0%	2.9%

The resources that households dedicate to strengthening their dwellings depend on their view of how durable these structures are. Households who feel that their dwellings are weak, try to dedicate resources to improve them because they feel vulnerable. On the durability of the dwellings, the survey found that 68% of the respondents in Freedom Charter and 76% in Msawawa felt that their dwellings are not strong enough to withstand strong winds, therefore expressing a sense of being vulnerable to severe winds. Households in Freedom Charter indicated that this is due to cracks, weak material, as well as the age of some of the dwellings. Households in Msawawa attributed this sense of vulnerability to strong winds, by weak materials used in constructing the dwellings. Indeed, the majority of the

<sup>13</sup> These are the houses that used to be the farmhouse before the area became an informal settlement. The current owners did not build them.

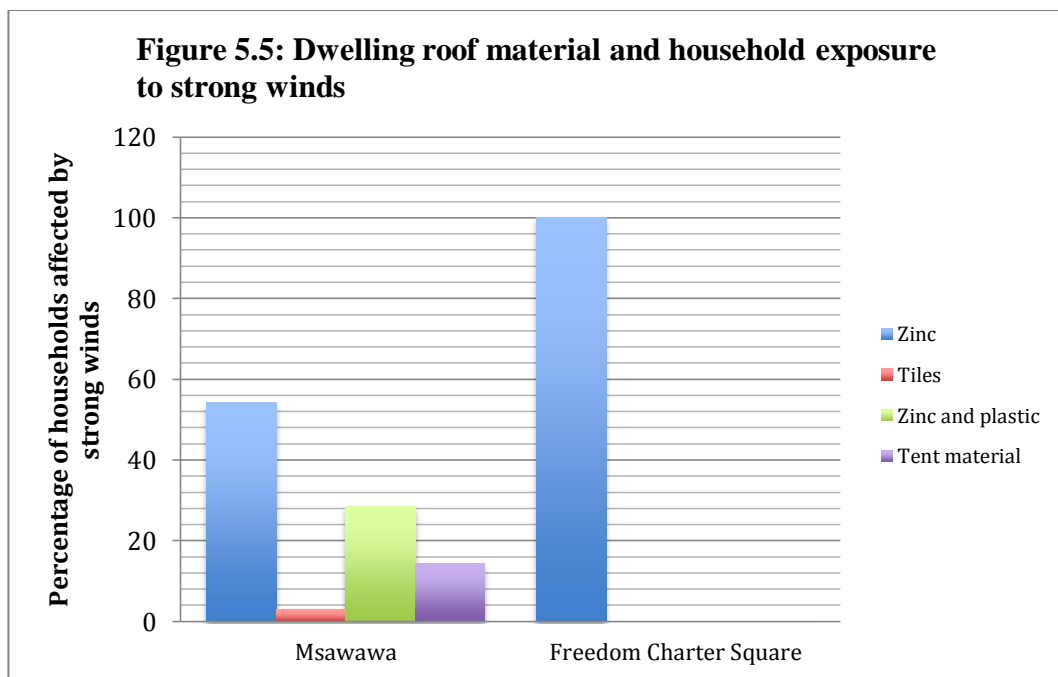
households in both Msawawa and Freedom Charter feel vulnerable to strong winds, and this is also evident in the amount of rocks and other heavy material that households place on their roofs (see Figure 5.4 showing rocks on roofs).



Figure 5.4: Rocks and other heavy objects to keep the roofs from collapsing due to strong winds and heavy rains in Freedom Charter (Source: Mpho Nenweli, March 2013)

Households are concerned about the vulnerability of dwellings to heavy rains. In terms of endurance to heavy rains, 87% of the survey respondents in Freedom Charter compared to 83% in Msawawa noted that their dwellings are vulnerable because their roofs leak and water penetrates the structures. In terms of fire, nine per cent of the survey respondents in Freedom Charter compared to 13% in Msawawa indicated that they felt that their structures were exposed and they would not endure any fires that may break out. The challenges related with fire in the two settlements emanated from factors such as lack of electricity, shacks being too close to each other and the fact that the structures were made of materials such as wood and plastic which are highly flammable. Comparatively, households feel significantly less vulnerable to fire as compared to strong winds and heavy rains.

The length of time that the households have stayed in the two settlements played a role in their vulnerability to strong winds. Given that construction materials used in informal settlements' dwellings tend to deteriorate over time, the survey found that households that were established for more than five years in Freedom Charter constitute 86% of those affected by winds, while they were 73% in Msawawa (this is only looking at those affected). The slightly higher percentage (86% stated above) for Freedom Charter is attributed to the fact that some households reside in houses that are older with roofs that are collapsing and susceptible to strong winds (see Figure 5.5) (unfortunately this study did not identify the number of these households). The issue of collapsing roofs on the older houses was confirmed in an in-depth interview with Shai (Mr. Shai, interview, 23 May 2013), a local community leader in Freedom Charter: 'We are talking of old houses since 1891 until now in 2013. It is a long time. When we talk of strong winds, there are lots of houses that fell down because of strong winds'.



Households in Msawawa and Freedom Charter have challenges in constructing structures that can endure strong winds and this is related to factors such as socio-economic status. The findings revealed that the households affected by strong



winds are mainly those with single household heads and no economically active people. Therefore, these households are exposed to the possibility of being adversely affected by the increased frequency of strong winds related to climate change. This possibility is also attributed to the limited amount of vegetation in the two settlements that could act as windbreaks. Indeed, the lack of planting of trees combined with felling of trees plays a key role in household exposure to strong winds (Pelling, 2003). This was observed in Kliptown by Bremner (2008, p. 337): '[t]oday Freedom Square is an open, windswept tract of land, lying between a shack settlement [Freedom Charter], a railway line, and a taxi rank and bounded by the facades of warehouses and wholesale stores. The trees that once lined its edges, providing shade for local traders and commuters, have mostly died'. As noted by Phalanndwa (Mr. Phalanndwa, interview, 24 May 2013) during the in-depth interview, Msawawa is also having similar challenges with the availability of trees, which makes winds more destructive. Therefore, the physical environment plays a role in the vulnerability of households to strong winds.

Households without economically active members are slightly more affected by strong winds due to their lower ability to secure their dwellings, relying mainly on recycled building materials because new materials such as corrugated iron and wood are unaffordable to them. Economic activity plays an important role on household vulnerability to extreme weather events such as strong winds related to climate change (UN-Habitat, 2010). In the two settlements, households without economically active members constitute more than 50% of those affected by strong winds. These households constitute 57% and 46% of those affected for Freedom Charter and Msawawa respectively. In terms of households with economically active members, those with one person who is economically active constitute 32% in Freedom Charter and 34% in Msawawa of those affected. The findings show that there is some link between the number of economically active members in the house and vulnerability to strong winds. The extent of economic activity among members in the household can be considered an element in reducing vulnerability to strong winds and providing some opportunity to access

resources such as funding and building material that help in improving household adaptive capacity.

The marital status of the household head also has an influence on the household's exposure to strong winds. The survey findings showed that economic activity discussed above plays a higher role on household vulnerability to strong winds as compared to marital status discussed below. As already noted, 52% of households with no economically active people are vulnerable to strong winds compared to 47% of married household heads. The survey findings on strong winds further show that there is a difference between households with married household heads compared to those that are not married. In Freedom Charter, 64% of the households headed by single people are vulnerable to winds as compared to 29% in Msawawa. This means that households in Msawawa that have married household heads (71%) are affected by strong winds. These findings point to the fact that there is a varied relationship between marital status and household vulnerability to strong winds across the two settlements. This can be explained when looking at household income of married as opposed to single household heads. The survey data shows that households with no income broadly constitute of 20% of those affected in the two settlements. In turn, an average of 21% of the households with income were negatively affected by strong winds. This confirms what was mentioned above that income does not necessarily equate to less household vulnerability to strong winds.

A combination of economic activity and the marital status of household heads play a role in vulnerability to strong winds in the two settlements. Furthermore, looking at economic activity, households with no economically active people and headed by single people (see Table 5.6 below) in Freedom Charter are the most negatively affected by strong winds. This is based on the fact that the single household head with no access to economic activity may struggle to have a dwelling (further elaborated below) that could withstand strong wind. Single household heads were 66% of those surveyed in Freedom Charter compared to 23% in Msawawa. This is the reason why the same picture is not reflected in

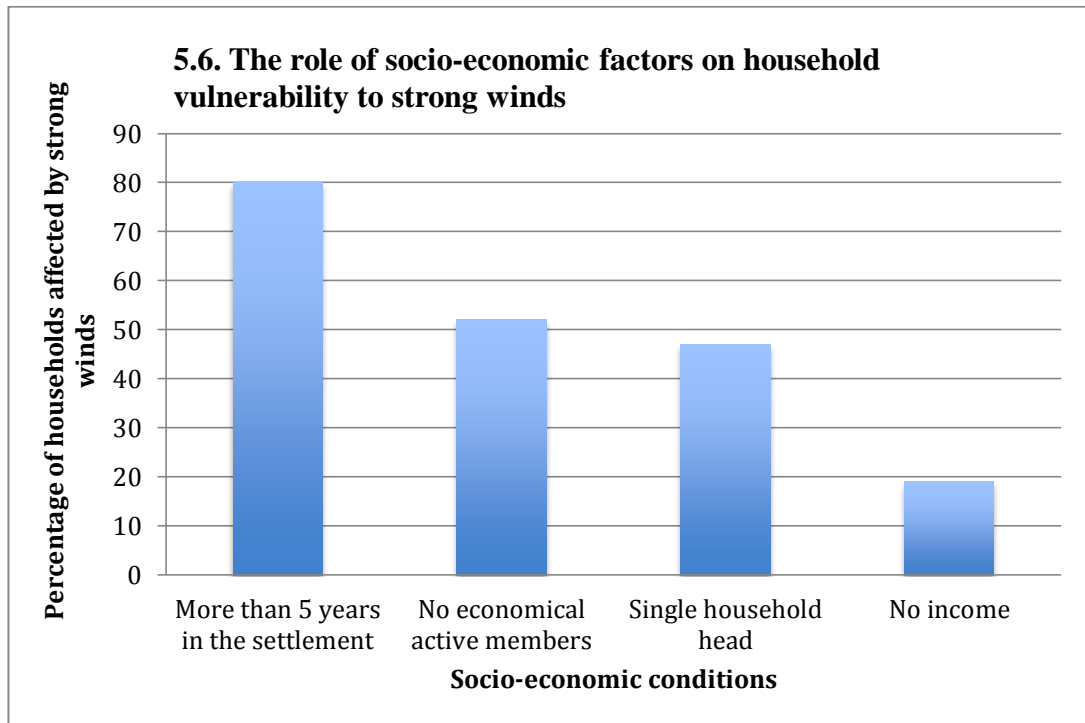
Msawawa. Thus, the findings for Msawawa show that households with no economically active people (46%) and headed by a single person constitute 29% of those affected. The lower amount of single-headed households affected by strong wind in Msawawa is attributed to the fewer single households surveyed (in the sample for this study), while in Freedom Charter the higher number is related to the higher proportion of single headed households in the sample. The other issue is that households with married heads affected by strong winds have more economically active household members in Msawawa (54%) as compared to those in Freedom Charter (46%). However, economic activity does not always translate into higher incomes and investment in durable dwellings. This view was confirmed by Blaikie et al. (1994) who indicated that economic activity with low income levels does not necessarily guarantee the ability of a household to have enough resources to build dwellings that can endure increased frequency and intensity of strong winds. There are other factors that affect the utilisation of household resources such as household size and health challenges. This makes economic activity less impactful in reducing exposure through, for instance, more durable dwellings (*ibid.*).

Table 5.6: Household vulnerability to strong winds (note that categories overlap)

<b>Variable</b>	<b>Households affected in Freedom Charter</b>	<b>Households affected in Msawawa</b>
No economic activity	57%	46%
Single household head	64%	29%

The research findings show that a combination of socio-economic factors such as income, economic activity, marital status and the duration the households have stayed in the settlement indeed play a role in household vulnerability to strong winds. The most significant (see Figure 5.6 for the household distribution of vulnerability in the two settlements) of these variables is the duration the households have stayed in the settlement, followed by economic activity, marital status and income. The nature of dwellings also affects the level of vulnerability

to strong winds in the two settlements. It is important to note that these factors are interconnected, and this means a household could be affected by more than one of those listed in Figure 5.6 below.



### 5.3.2. Household exposure and impacts of extreme heat

Extreme heat has negative impacts on household quality of life in both Msawawa and Freedom Charter. As noted in the literature review in Chapter 3, unusually high temperatures are altering weather patterns and also have a negative impact on the poor who reside in dwellings with poor ventilation (Douglas et al., 2008), and it is predicted that due to climate change these events will become more frequent (UN-Habitat, 2011). Households in Msawawa and Freedom Charter generally indicated that heat is primarily a challenge in summer. It was also expressed by Murray (2008) that people residing in informal settlements also have to deal with stifling heat in their dwellings and surrounding areas almost all the summers. According to the in-depth interview with Gwata (Mr. Gwata, interview, 28 May 2013), there is a noticeable observed increase in temperatures (notable frequency

of days with intense heat) in the City of Johannesburg, and this is in line with projections outlined in the City of Johannesburg Climate Change Adaptation Plan.

There are various impacts of increased frequency and intensity of extreme heat (see Figure 5.7) for households in Msawawa and Freedom Charter. The survey respondents pointed out that the main effect of extreme heat was uncomfortable conditions in the dwellings and household members being forced to leave the dwelling due to the indoor heat and spend time outside. This is followed by sickness, and food going off in the absence of any refrigeration. Other identified effects of heat in the two settlements were mosquitoes (in summer), flies and sunburn. This correlates the fact pointed out in the literature in Chapter 3 that extreme heat can lead to constant sickness such as heat exhaustion, severe headaches and dizziness (Magrath, 2010). Further, the literature pointed out that extreme heat could also lead to a reduction in productivity related to heat exhaustion, especially from employees (*ibid.*).

There is a notable difference between Freedom Charter and Msawawa in how households have been affected by extreme heat. The findings revealed that 63% of the households in Freedom Charter and 86% in Msawawa indicated they have been suffering from exposure to extreme heat in the past ten years. Furthermore, households with no economically active members constitute the most of those affected by extreme heat in Freedom Charter (59%) compared to 46% in Msawawa. Notably, in the two settlements households with no economically active members are more affected by extreme heat. This is attributed to the fact that, to a certain extent, some of the households with no economically active members have limited resources to build better dwelling structures that can reduce their exposure to extreme heat. These households with the lowest income resort to black PVC plastic sheeting to prevent leaks on their corrugated roofs. In the two settlements, there are households that reside in shacks that are either composed of plastic materials (see Figure 5.8) or of corrugated iron with no insulating material on the inside. These are also households in the settlements with the smallest shacks with minimal ventilation making them hot in summer. The contrast in the above findings is that in Msawawa households with economically active people

are the most affected by strong winds. This may be attributed to the fact that although they are economically active but do not derive any significant income. The findings further showed that there is no significant difference on household exposure to extreme heat related to marital status and sex of household head.



Figure 5.7: A shack in Msawawa with people outside due to indoor heat (Source: Mpho Nenweli, March 2013)

### **5.3.3. Household exposure and impacts of extreme cold**

In addition to heat, there are challenges related to the increased frequency and intensity of extreme cold conditions experienced by households in the two informal settlements. Murray (2009), reviewed in Chapter 2, noted that the poor in Johannesburg's informal settlements stay in situations where they are routinely subjected to extreme cold. The survey revealed that 65% of the households contacted in Freedom Charter and 91% in Msawawa indicated that extreme cold is

one of the challenges that they have had in the past ten years. Msawawa has the higher proportion of households negatively affected by extreme cold in winter. According to perceptions of the survey respondents in Msawawa, the extreme cold is attributed to the river in the area, which is in the close proximity to many households because the area is densely populated. Some of the shacks are also built from plastic material, making them very cold in winter (see Figure 5.8). The micro-climate relating to the river appear to be relevant to understanding temperatures in Msawawa given that literature provides a different perspective on extreme cold in Johannesburg. As discussed in Chapter 2, Storie (2014) indicates that the northern part of the City of Johannesburg has slightly higher temperatures compared to the southern part and it experiences less frost in winter.



Figure 5.8: An example of a small shack in Msawawa with plastic roofing, located near the Jukskei River (Source: Mpho Nenweli, March 2013)

Flooring in the dwellings is vital in helping households to cope with extreme weather events such as extreme cold. The predominant flooring material used in the dwellings is concrete (See Table 5.7), 14% in Freedom Charter compared to

eight percent in Msawawa use nothing for flooring, while 15% use plastic in Msawawa and three per cent in Freedom Charter. Seven per cent of the households in Freedom Charter compared to three per cent in Msawawa indicated that they have tiled floors, while less than one per cent have mats on soil in Freedom Charter compared to nine per cent in Msawawa. Only two per cent of the households in Freedom Charter rely on wooden flooring without concrete below it. Flooring such as plastic makes households relatively exposed to extreme cold especially in cases where there is no concrete below the plastic. This also affects the health of the household negatively. Households mainly use these types of flooring with limited access to economic opportunities.

Table 5.7: Flooring material used by households in Freedom Charter and Msawawa

<b>Flooring type</b>	<b>Households in Freedom Charter</b>	<b>Households in Msawawa</b>
Concrete flooring	73%	65%
Nothing on the floor	14%	8%
Plastic flooring	3%	15%
Tiling	7%	3%
Matt	1%	9%
Wooden flooring	2%	0%
Total	100%	100%

Extreme cold has contributed to a negative impact on the health of households in Msawawa and Freedom Charter. The challenges cited by respondents related to extreme cold were sickness, people being forced to use coal stoves with inadequate smoke extraction, the burning of shacks by fire as a result of heating techniques (further discussions below) and high expenditure on fuels such as coal for heating. The other challenge related to extreme cold in winter is the air pollution related to the burning of coal, wood, plastic and any other material that burns, the pollution creates discomfort and relates to health challenges such as lung infections. Less than one per cent of the affected households in Msawawa



and Freedom Charter indicated that extreme cold made it difficult for children to wake up and go to school. In the in-depth interview, Mafokwane (Councillor Mafokwane, interview, 25 May 2013) in Msawawa, explained that the burning of the above-mentioned items when it is extremely cold also contributes to local outdoor air pollution. Similar to the survey respondents, he noted smog, especially in the evenings and mornings in winter reducing the level of visibility, and indirectly leading to increases in criminal activity. During the in-depth interview with Phalanndwa who is a local community leader (Mr, Phalanndwa, interview, 24 May 2013) in Msawawa, he indicated that the City of Johannesburg does not have a plan to stop the burning of materials contributing to pollution and health challenges such as lung infections because it cannot offer residents of Msawawa alternative and cleaner sources of energy.

Exposure to disease and access to health facilities also impacts on households' ability to adjust to potential impacts of extreme cold. The level of members affected by various diseases constitutes to a certain extent a burden of looking after the sick, which negatively affects available resources and productivity (Wisner, 2003). The literature review in Chapter 3 indicated that household health conditions determine productive capacity (Pelling, 2003). Sick household members have the potential to drain household resources, thereby impacting negatively on the household's ability to improve coping and adaptive capacity. Compounding this, the exposure of household members to diseases draws the energy and resources of able-bodied members who will have to undertake additional tasks like taking household members to clinics, which are not close in Freedom Charter in particular. Residents in Msawawa are relatively better off than those of Freedom Charter Square because there is a clinic alongside the settlement, although this functions only once per week (Mr Phalanndwa, interview, 24 May 2013).

Economic activity and sex of the household head contributes to the level of household vulnerability to extreme cold. Households with no economically active members (63% in Freedom Charter and 46% in Msawawa) in the two settlements

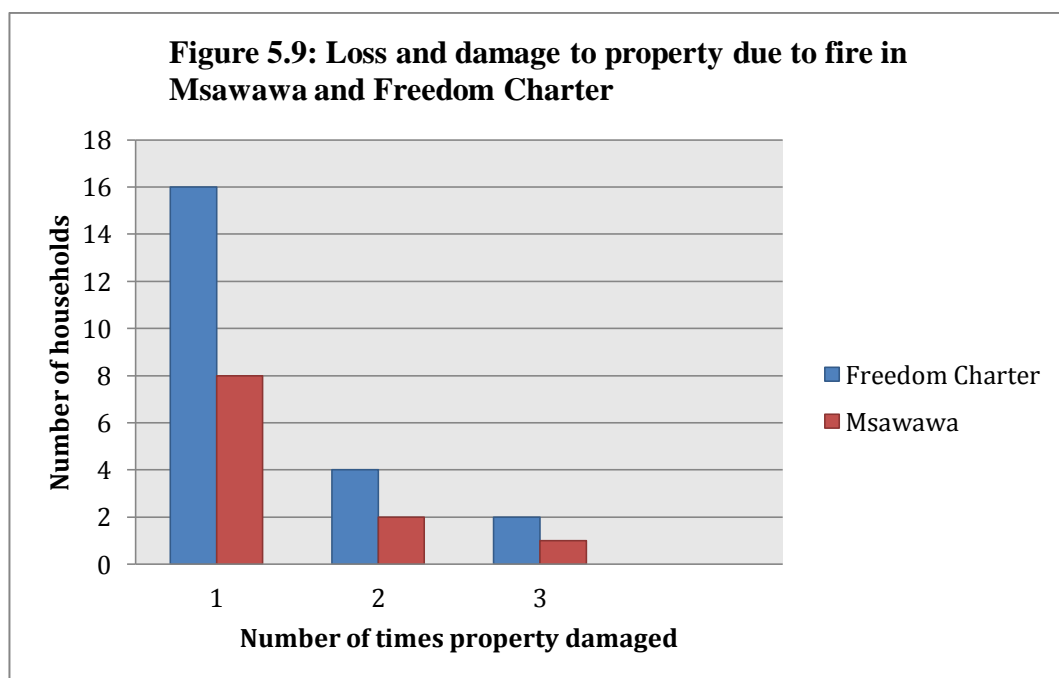
constitute the most of those who are negatively affected by the impact of extreme cold in winter. The survey findings indicate that this is also attributed to their inability to have enough blankets in winter and heating sources for keeping themselves warm. Male-headed households constituted 52% of those affected by extreme cold in Freedom Charter while it was 76% in Msawawa. The findings show that male-headed households with no economically active members are the most affected by extreme cold in Msawawa and Freedom Charter. However, there are 11% male-headed households with no economically active members that are not exposed to extreme cold. In Msawawa, all male-headed households with no economically active members are exposed to extreme cold. Further, in Msawawa there were 30% of the households that are male-headed with economically active members that were exposed to extreme cold. Broadly in the two settlements, the survey findings further show that female-headed households are less affected by extreme cold and this could be attributed to their ability to use resources well in doing things such as buying clothes and blankets, and building better dwellings. Further, comparing economic activity and sex of the household head, the survey shows that there is 64% of male-headed households affected by extreme cold, compared to 55% of households with no economically active members. Therefore, the sex of the household head could be considered one of the factors impacting on household vulnerability to extreme cold.

#### **5.3.4. Household exposure and impacts of fire**

Raging fires related to extreme cold in winter have become some of the occasional tragic occurrences that occur to people living in some of the informal settlements in Johannesburg that include Msawawa and Freedom Charter. As highlighted in Chapter 2, Murray (2009, p. 168) noted that these fires in Johannesburg's informal settlements are attributed to the 'spatial geography of vulnerability and the everyday ecology of inequality'. During interviews with the survey respondents it was frequently mentioned that in winter when households are exposed to extreme cold they tend to use various ways to keep warm, for example by burning paraffin and coal stoves that lead to fires. The in-depth

interview with Mafokwane (Councillor Mafokwane, interview, 25 May 2013) confirmed this. Mafokwane explained that, towards winter, that's the time when they have more outbreaks of fires [in Msawawa]. The use of coal stoves, wood stoves and paraffin stoves are the main causes of fires. According to Murray (2009), these fires are also an outcome of inadequate strategies of fire suppression and prevention, combustible building material and the layout of informal settlements. Goliger and Retief (2007) indicated that the spread of fires is also one of the impacts related to strong winds. In the discourse on informal settlement upgrading, Misselhorn (2008) highlights that the impact of fire may be exacerbated by the inaccessible nature of some informal settlements due to dwellings being too close to each other and a lack of access roads.

The findings show that there is a similarity in the impact of fire on households in Msawawa and Freedom Charter. In fact, Freedom Charter has approximately 15% (actual amount is 14.8%) of the households that were affected by fire disasters in the past ten years compared to 20% in Msawawa. Notably, approximately 18% of households that were contacted during the survey across the two settlements reported having been affected by fire disasters in the past ten years (see Figure 5.9, note that some families were affected by fire disasters more than once).



In the in-depth interview, Councillor Mafokwane (Councillor Mafokwane, interview, 25 May 2013) shared his first-hand experience and views regarding the occurrence of fire in Msawawa, bringing some of the above findings to life:

Some of the fires are due to negligence, because you know men and women get drunk like there is no tomorrow and they are reckless. They leave children in there [their shacks] alone. The poor kids are trying to put up some meals for the evening and the Councillor's phone would ring at 9 o'clock in the night, it is EMS [City of Johannesburg emergency services]. They would say: Councillor, we are in your ward, first of all, we are in the area called Msawawa but it is dark, but you know, we don't know which shack we must be attending to because there are simply no roads in Msawawa. I must jump into my bakkie [pick-up vehicle] and try to go there and say to the residents, hey man, in future you must take buckets and throw at the thing [fire], you know.

According to the survey findings, fires have varied negative impacts on the wellbeing of households in Msawawa and Freedom Charter, depending on the households' duration of stay in the settlements and marital status. This may have to do with the duration that they have been staying in the areas which increases the likelihood of being affected. These households mentioned above constitute 95% and 77% of those affected by fire in Freedom Charter and Msawawa respectively. These households are approximately 86% of the households that were affected by fire<sup>14</sup> in the past ten years in both Msawawa and Freedom Charter combined. Households headed by single members are the worst affected by fire disasters in Freedom Charter (they are 70%) compared to those that are managed by married household heads, while in Msawawa, households with married household heads are worse off (62%). Households which have stayed in the areas for more than five years are the worst affected by the impact of fire in the past ten years. The impacts of fire on households in Msawawa and Freedom

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<sup>14</sup> This is a proportion of those affected by fire.

Charter were loss of life, feeling insecure, injury, displacement and damage to property.

The findings noted above further show that households that resided in the two settlements for more than five years have a higher chance of having been affected by fire in the past years. The accidental nature of these fires in the informal settlements makes it complex to attribute exposure to marital status and sex of the household head. The findings also confirmed that economic activity does not play any role in vulnerability to fires in the two settlements. Therefore, the above findings mainly show that households that are more exposed to the impact of fire were mainly those headed by single household heads. On exposure to fire, the most significant factor was the duration the household has stayed in the settlement (this was 86% of those affected), compared to single-headed households (66%). The findings here make a case for the need of upgrading the two settlements or relocating the households. This is due to the inevitability of households being exposed to fire, the almost inevitable loss of assets over time and therefore having a real impact on households' ability to accumulate an asset base in the two informal settlements.

### **5.3.5. The impact of precipitation related extreme weather events on households in Msawawa and Freedom Charter**

There are varied impacts of natural hazards related to rainfall in the two informal settlements. Heavy downpours, hail and floods negatively affected households in Msawawa and Freedom Charter. Furthermore, new insight emanating from the findings is that the households in the two settlements are more affected by heavy downpours (73%) compared to hailstorms (50%), floods (14%) and drought (14%). The level to which households are affected is influenced by a combination of factors such as the landscape (particularly for floods), economic activity and marital status.

### 5.3.5.1. *Household exposure to heavy downpours*

Rainfall patterns and their impacts have been changing in the City of Johannesburg over the past years. In the literature review it was noted that rainfall patterns vary between the north and south of the city. This was highlighted by Storie (2014, p. 40) who indicated that ‘the areas north of the ridges show slightly higher rainfall and temperatures’. During an in-depth interview with Gwata (City of Johannesburg official responsible for climate change adaptation) (Mr. Gwata, interview, 28 May 2013) he noted that the City has experienced an increase in rainfall in the past years. He further noted that it has been raining for shorter periods in summer, but in some instances with higher intensity. However, he further indicated that there are inter-annual variations on rainfall (*ibid.*). Gwata (Mr. Gwata, interview, 28 May 2013) also mentioned that there are occasional heavy rains that lead to flooding but these are attributed to cut of low weather events and one such event was experienced in 2009 and it mainly affected Soweto, near where Freedom Charter is located.

The survey findings show that the impact of heavy downpours on households were roof leaks, damaged clothes, flooding, damaged furniture, damage to shacks, bad odours in the shacks caused by wet clothes and dampness. Some of the negative impacts of heavy downpours are attributed to the physical layout of the settlement. The physical layout of the settlements contributes to heavy downpours and the intensity of their impacts on households. Some of the challenges that cause downpours to negatively impact on households in the two settlements is a lack of an ‘integrated drainage system’ as is the case in most informal settlements (Douglas et al., 2008, p. 191). The access routes in the two areas are mostly not tarred and they are slippery during the times when there are heavy rains. Duiker (Mr. Duiker, interview, 23 May 2013) notes that heavy rains in Freedom Charter sweep away all the waste into the Klip River and cause erosion, and this results in the pollution and siltation of the river. This is made worse by the fact that the local community removed the willow trees that used to be found along the Klip River (*ibid.*). The removal of trees and soil cover has a contribution to the intensity of the impact of storms due to increased runoff (Douglas et al., 2008;

Magrath, 2010). As pointed out in the literature review in Chapter 3, the occurrence and volume of prolonged heavy rainfalls are starting to have an impact on the lives of the poor households in informal settlements (Douglas et al., 2008).

Some of the dwellings in Freedom Charter and Msawawa are not strong enough to endure heavy rains. The above discussion (in Section 5.2.3.) proved that the dwelling structures that people reside in in Msawawa and Freedom Charter are not reliable assets that can shield them from precipitation related challenges such as heavy downpours. The lack of reliable and strong dwellings also impacts negatively on some of their moveable assets that they keep in their houses, such as furniture and appliances<sup>15</sup>. Therefore, households live in situations where their moveable assets get completely destroyed or damaged continuously, trapping them in a cycle of poverty and vulnerability. The households are exposed to heavy downpour disasters and they seem to have limited potential to invest in structures and assets that can make them less vulnerable to climate change related disasters. The inability somehow may be viewed to show that households are living in a permanent state of emergency as outlined by Davis (2006) in the literature review.

Evidence from the survey findings shows that heavy downpours based on economic activity and marital status variably affected households in the two settlements. The survey findings pointed out that 73% of the respondents in Freedom Charter and 72% in Msawawa indicated that heavy downpours affected their households in the past ten years. Households without economically active members are the ones suffering more from the impacts of heavy downpours. These households constitute 64% in Freedom Charter and 47% in Msawawa of those that are affected by heavy downpours (this is a proportion of the 73% and 72% respectively, listed above) (see Table 5.8). Notably, approximately 56% of the households in the two settlements, *i.e.*, households with no economically active members are the most affected. This further supports the view that households with no economically active members suffer the most and this is attributed to their lack of access to resources and consequently their inability to

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<sup>15</sup> Households accessing illegal electricity in Freedom Charter had appliances.

own durable structures that can endure heavy rainfall. In terms of marital status, households headed by married members (33% for Freedom Charter and 72% in Msawawa) were more affected by the negative impacts of heavy downpours in the past ten years. This reveals that married-headed households with people who are economically inactive are also more vulnerable to heavy downpours. In this case, the findings show that households headed by married people still require access to economic resources such as income in order to be able to limit their exposure and impact of heavy downpours by building better dwellings. The survey findings also showed that in the two settlements, households with no economic activity are mainly the ones affected compared to those with married heads. In this case, economic activity plays a prominent role in exposure to heavy downpours.

Table 5.8: Households affected by heavy downpours in Freedom Charter and Msawawa

Area	Affected by heavy downpours		
	Total affected	Economically active households (percentage of the total affected)	Married household head (percentage of the total affected)
<b>Freedom Charter</b>	73%	64%	33%
<b>Msawawa</b>	72%	47%	72%

#### 5.3.5.2. Household exposure to hailstorms

Torrential rains at times bring with them devastating hailstorms, which have negative impacts on people's lives and properties in informal settlements. According to the survey findings, approximately 53% of respondents in Freedom Charter and 46% in Msawawa indicated that their households were affected by hailstorms in the past ten years (See Table 5.9). This is attributed to the fact that Freedom Charter has relatively older houses (this study did not seek to identify the number of these houses) than those in Msawawa, which are relatively recent structures even though some of them may also be weaker. Furthermore,



households with no economically active members constitute 88% of those negatively affected by the impact of hailstorm in the past ten years in Freedom Charter, while they constitute 50% in Msawawa. Households that are headed by single members are also the majority of those affected by hailstorms in Freedom Charter (66%), while in Msawawa those with married household heads are most affected (70%). These findings show that in Freedom Charter, households headed by unmarried people and with no economically active members are the most affected (77%) by hailstorms. In Msawawa households headed by married people and with no economic active members are the most affected (60%) by hailstorms. These differences show that although marital status plays a role in household exposure to hailstorms, however economic activity is also a key factor. Therefore, access to resources is vital in building better dwellings that could endure hailstorms. This lack of access to economic resources in Freedom Charter was echoed by Duiker (Mr. Duiker, interview, 23 May 2013) who said that: ‘people [referring to business people operating near the Freedom Charter Square] come here and make money in this locality and take the money out. So nothing is spent here’. The survey respondents indicated that the household effects of hailstorms were trapped ice on roofs, which caused extreme cold inside the dwellings. The other identified impacts were damaged roofs, broken windows, destroyed gardens, destroyed solar panels and flooded settlements.

Table 5.9: Households affected by hailstorms in Freedom Charter and Msawawa

Area	Affected by hailstorms		
	Total affected	Economically active households (percentage of the total affected)	Married household head in (percentage of the total affected)
<b>Freedom Charter</b>	53%	88%	66%
<b>Msawawa</b>	46%	50%	70%

The households surveyed in Msawawa and Freedom Charter noted that the increased frequency and intensity of hailstorms negatively impact on their quality

of life and resources. Gwata (Mr Gwata, interview, 28 May 2013), Sibanyoni (Councillor Sibanyoni, interview, 22 July 2013) and Duiker (Mr. Duiker, interview, 23 May 2013) concur that overflowing water (resulting from intense rainfall accompanied by hailstorms) from the settlements due to runoff is also a challenge for some communities in the City of Johannesburg, especially those in Freedom Charter. These heavy rains make it impossible for some people to go to school or work when the Klip River is overflowing. In the two settlements the most significant factor contributing to household vulnerability to hailstorms is having economically active members in the household (69%) as compared to single-headed households (45%). As noted in the literature review, residents of informal settlements have to deal with routine challenges of overflowing waterways attributed to heavy rains (Murray, 2009; UN-Habitat, 2011) attributed to lack of drainage systems (Lall & Deichmann, 2012), covering large areas with concrete and people living on floodplains (Huq, Kovats, Reid, & Satterthwaite, 2007). In particular, overflowing water related to heavy rains is becoming frequent and severe for the poor in urban areas (Douglas et al., 2008).

#### ***5.3.5.3. Household exposure to floods***

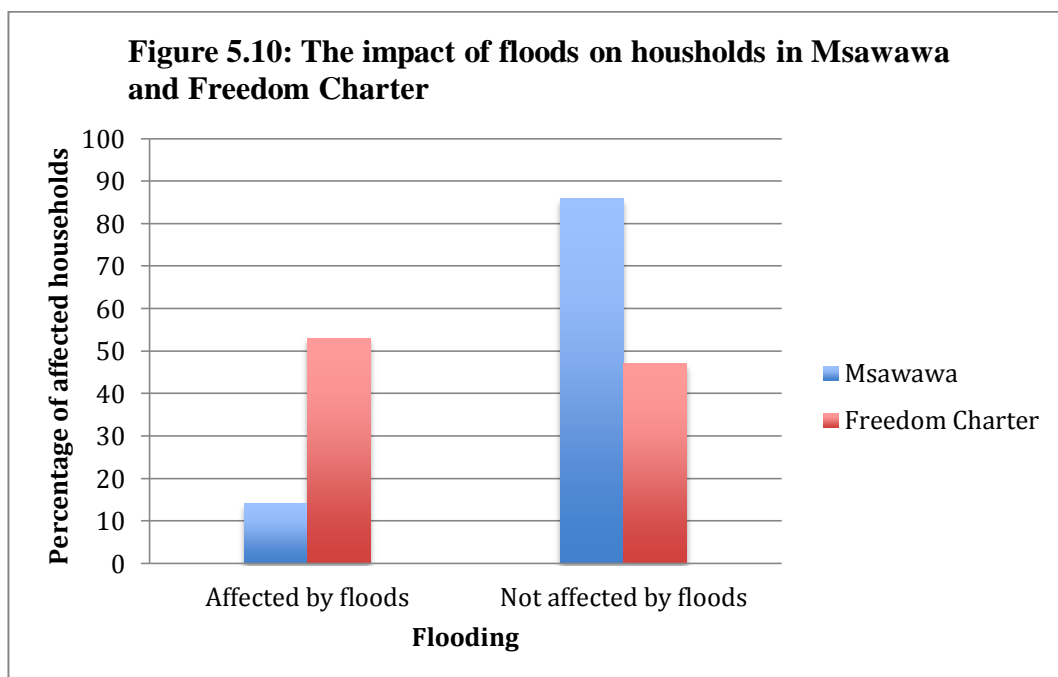
Floods have a long history of torment for residents of Msawawa and Freedom Charter residing in the floodline. Flooding will be one of the outcomes of climate change that will negatively affect communities, especially those in urban areas residing in vulnerable environmental and social conditions (Lewis & Mioch, 2005). The impacts of floods on households were destruction of dwelling structures, lack of access to the dwellings and belongings such as clothes and food. In the in-depth interview with Gwata [City of Johannesburg official in charge of climate change adaptation) (Mr. Gwata, interview, 28 May 2013) included mention that that flooding has also affected heritage resources such as buildings, and property owners in Johannesburg who are losing portions of their land due to erosion. It was evident that erosion is also taking place within Freedom Charter and Msawawa along pathways due to lack of drainage facilities. Gwata (Mr. Gwata, interview, 28 May 2013) indicated that the flooding in

Freedom Charter has always been a challenge over the years, that the area is susceptible to flooding at any time, even without heavy rainfall in the area. He further implied that these causes may include siltation of the Klip River due to land uses that increase erosion upstream (*ibid.*). While the Jukskei borders Msawawa, the settlement is sloped and therefore only a few households in low-lying shacks are within the flood line and affected by flooding in summer. large proportion of Freedom Charter is flat and within the flood line, as indicated by Sibanyoni (Councillor Sibanyoni, interview, 22 July 2013) who is acutely aware of this challenge. Gwata also expressed his view on flooding in Freedom Charter by saying that:

When the rain falls, it affects the people. What I seem to discern is that certain people are now starting to be affected by this, maybe for the first time and people are starting to ask questions on exactly as to why, for example along the Klip River, whereas it used to flood there, the people are not denying that... but they were saying in 2010 for example, the rain has never gone up to this area, you know, to this point. Of course the rain will fall and the roads will flood. The water came on, we [City of Johannesburg] went there a few days after the 2010 flood, you could see the water marks on the houses, and those guys were saying this is the worst.

Floods affect households in the two settlements differently, based on economic activity. The findings revealed that, 47% of the households in Freedom Charter and 14% of the households in Msawawa indicated that floods have affected them in the past ten years. The survey findings showed that 59% of households affected by floods in Freedom Charter were those without economically active members (see Figure 5.10) as compared to 78% Msawawa. In the two settlements, the findings also showed across both settlements that having economically inactive members in the household is the main factor contributing to household vulnerability to floods. The findings corroborated what was stated in Chapter 2, namely that the most vulnerable to flooding as highlighted by Few (2003, p. 48) tend to be 'the low-income peoples, migrants, those living in flimsy houses, those

without insurance or financial reserves, the elderly and the infirm'. Therefore, a proportion of those with economically inactive members have limited means to address exposure to flooding. The findings also revealed that the other reasons were the fact that their dwellings are within the flood line and they are also not built to endure floods. Duiker (who grew up in Kliptown near Freedom Charter and having decades of leadership in local structures) (Mr. Duiker, interview, 23 May 2013) states that flooding in Freedom Charter has been on-going and cyclic. He further gave his own view that some households deliberately move to flood prone areas in order to be prioritised in subsidised housing allocation, a tendency that my survey was not designed to confirm or refute. The assertion that informal settlement residents deliberately try to jump the queue through their residential choices, as (Huchzermeyer, 2011) notes, is often used politically in South Africa to legitimise repressive informal settlement eradication drives.



A considerable number of households in the two settlements consider their dwellings vulnerable to floods. The survey results show that 33% of the households in Freedom Charter indicated that they perceive their structures to be vulnerable to flooding compared to 12% in Msawawa. In Freedom Charter, flooding was attributed to the fact that dwellings are close to the river and water

flows into the dwellings. Similar reasons were mentioned in Msawawa. The recurring nature of floods makes it difficult to improve assets such as better dwellings that could reduce their future vulnerability. In this context the biophysical environment also contributes to vulnerability to climate change.

#### ***5.3.5.4. Household exposure to drought***

Drought related to changes of climate change over a long period will be a challenge to communities in urban areas (Lewis & Mioch, 2005; UN-Habitat, 2011), especially in instances where people are forced to migrate from rural areas to urban areas (Barrios et al., 2006; Douglas et al., 2008). The survey findings do not show any significant impact of drought in Msawawa and Freedom Charter, because 14% of households indicated that they were affected by drought in the past ten years. Those affected by drought constitute 15% in Msawawa and 13% in Freedom Charter. The limited number of households affected by drought may be attributed to the fact that communities in urban areas, especially informal settlements, engage in limited agricultural activities due to the conditions in which they live. This study did not set out to understand the number of people doing this in the two settlements. However, when doing the survey I noticed some gardens in Freedom Charter on the peripheries of the settlements.

Households in the two settlements have limited access to land for agricultural purposes. However, some of the households might have settled in the informal settlements in response to droughts in other areas (this study also did not explore this issue). Literature reviewed in Chapter 2 pointed out that climate change reduces the agricultural potential in certain regions and is predicted to increase city-ward migration. The other fact is that households in the urban areas are still connected to their relatives and friends (this is further discussed below) in rural areas where agriculture is mainly practised in South Africa. Some of these households receive remittances that are from funds related to farming in those areas (remittances are also discussed in detail later). Less than one percentage of the households reported to be receiving dried foodstuffs such as vegetables and

also mealie meal. In this context, drought has an indirect impact on some households in Msawawa and Freedom Charter. Although the survey findings prove that drought is not considered a major factor in Msawawa and Freedom Charter. There were limited identified impacts in Freedom Charter that were listed by respondents during the survey and these were, illness (8%), frustration and anger (4%), hunger (related to lack of food) (2%), while in Msawawa it was hunger (9%), illness (3%) and, frustration and anger (3%). The findings have demonstrated that the immediate or direct impact of drought is less significant in an urban than a rural context, but indirect impacts need to be explored further.

#### **5.4. Conclusion**

This chapter provided an understanding of household exposure to extreme weather events and related disasters that are being experienced in Freedom Charter and Msawawa. The findings showed that Freedom Charter and Msawawa are prone to extreme weather events such as heavy downpours, hailstorms, flooding and drought. As already noted, the survey findings further showed that the significant extreme weather events related to precipitation are heavy downpours, compared to hailstorms, floods and drought. At the other extreme, weather events not related to precipitation such as extreme winds, cold, fire and heat, the study found that the most significant is extreme cold followed by extreme heat, strong winds and fire. When looking at the findings on impact of extreme temperature and precipitation related events, new revelations are that households in the two settlements are more vulnerable to extreme cold, heavy downpours, extreme heat, hailstorm, strong winds, floods, fire and drought. The respondents also indicated that these extreme weather events are seasonal, with flooding in summer and fires mainly in winter. The geographical location of the two settlements contributes to them being affected by floods. This is due to the fact that some households reside within the flood lines. These findings prove that

biophysical factors play a role on household vulnerability to extreme weather events in the two settlements.

The survey findings also showed that socio-economic factors play a role in how households are affected by extreme weather events. The prevailing socio-economic conditions such as low levels of income, ill health of household members and limited economic activity in the two settlements show that the households do not have the ability to adjust to potential impacts related to climate change. Households who have stayed more than five years in the two settlements were the most affected by fire and strong winds. Households with no economically active members were the most affected by heat, heavy downpours, hailstorms and floods. Notably, lack of economic activity has proved to be a key factor in household vulnerability. As indicated above, the other socio-economic factors playing a role are the duration of time that the household stayed in the settlement, sex and marital status of the household head. Respondents that have no economically active members in the households implied limited access to resources such as finance that could help in improving household adaptive capacity. Furthermore, the findings confirmed that economic activity does not necessarily guarantee that a household is less vulnerable. Households have to be able to use their resources in better dwellings to reduce vulnerability. For example, households with economically active members are the most vulnerable to strong winds in Msawawa compared to Freedom Charter.

There are different impacts of extreme weather events discussed above in Freedom Charter Square and Msawawa. In particular, Msawawa is more affected by the various extreme weather events, with heavy downpours affecting slightly more households in Freedom Charter. The survey findings indicated that floods cause destructions to property and belongings, droughts cause hunger, fires cause destructions to property and belongings. Furthermore, the survey found that the impacts outlined in this Chapter reflect how households use their income and their future ability to respond. The other reported impacts related to extreme cold and cold were health challenges. Some of the respondents indicated that health

challenges affect household productivity. This is due to the fact that limited resources have to be used for caring for sick members in the households. The following chapter provides insight on how households have responded to the extreme weather events discussed in this chapter.



**6. CHAPTER SIX: HOUSEHOLD RESPONSES TO  
CLIMATE CHANGE IN MSAWAWA AND  
FREEDOM CHARTER SQUARE**

## 6.1. Introduction

This chapter builds on the findings on household exposure and vulnerability to climate change that have been presented in Chapter 5. Chapter 5 mainly dealt with the role of socio-economic conditions and degree of exposure and sensitivity to extreme weather events in relation to climate change. The present chapter looks at the various household responses to strong winds, heat, cold, heavy downpours, hailstorms, floods, drought and fire. The chapter goes further to outline how households have coped and adapted to climate change over the years. As noted in the literature review, Chishakwe et al. (2012) show that household adaptation is dependent on the asset base (discussed in Chapter 5), institutions such as government (discussed in Chapter 7) and community organisations (*i.e.*, important for burials), knowledge (of options on how to adapt), innovation and governance (also discussed in Chapter 7). This chapter provides information that confirms the significance of asset bases and local institutions in household coping and adaptation. In overall, the findings revealed that there more coping taking place in Freedom Charter and Msawawa as compared to adaptation and this is attributed to the low asset base, weak institutions and low household knowledge on how to adapt, absence of innovation and inadequate governance. This chapter analyses actual responses, planned responses and the difference between actual responses and what households planned to do to respond to extreme weather events.

In so doing, this chapter provides findings that address the following objective and related sub-questions.

Objective:

- ✓ To determine ways in which households in informal settlements have coped and adapted to climate variability and change in the past and present, and to assess what enables adaptive capacity.

Sub-questions within this objective are:

- How have households in informal settlements with coped and adapted to climate change?

- To what extent and through which resources may households in informal settlements be able to adapt to anticipated threats?

## **6.2. Household responses to extreme weather events**

This section assesses household responses to strong winds; heat, cold, heavy downpours, hailstorm, floods and drought. In this section, household responses are assessed to understanding coping and adaptation strategies that households rely on to respond to extreme weather events. Furthermore, the main findings presented here show the reliance of households on coping mechanisms with limited adaptation to climate change. The main responses that households in Msawawa and Freedom Charter have identified revolve around reconstructing the existing dwellings after exposure to extreme weather events without necessarily reducing vulnerability.

### **6.2.1. Household responses to strong winds**

Households in Msawawa and Freedom Charter have been responding to extreme wind through various creative ways that include repairing dwellings and sourcing assistance through their social networks. The survey outcome showed that actual responses to dwelling damages identified during the survey by respondents in Freedom Charter were an array of coping mechanisms such as repairing the dwellings (also with the help of neighbours)<sup>16</sup> (see Table 6.1), obtaining loans for repairing shacks, staying with neighbours, taking refuge at the local community centre and putting stones on the roof. Damages related to strong wind make considerable negative impacts on moveable property in Freedom Charter and Msawawa, and households are forced to find ways to respond. In terms of damaged household goods, the actual coping responses identified by households in Freedom Charter were the buying of used replacements for damaged goods,

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<sup>16</sup> Note that in some instances households may have more than one response. Therefore, responses do not add up to 100%.

disposal of damaged goods and repairing. Another response involved selling scrap to generate income for replacing the damaged goods. The findings here confirm what was pointed out in the literature review, that strong winds in South Africa make life in informal settlements difficult due to the damage that they cause mainly to dwellings and households that are forced to spend time and resources in responding (Goliger & Retief, 2007).

In Msawawa, actual coping responses to dwelling damages were similar but differently distributed across the sample: repairing the dwellings with the help of other households (see Table 6.1), putting stones on the roof and asking neighbours for a place to sleep until the worst damage to the dwelling could be repaired. Similarly, household responses to damaged moveable property in Msawawa were disposal of damaged goods, repairing and replacing. The limitation to households' ability to respond in a manner which they wanted to was reported to be the result of a lack of funds and lack of support from local organisations and government (detailed discussion follows below). Although the above-mentioned responses portray creative ways in which households in the two settlements have been responding to strong winds, they also show the households' inability to develop ways of adapting, such as durable technical solutions (note that placing heavy stones on roofs, while low in cost, can in turn lead to denting of corrugated iron and the emergence of leaks). The households indicated that the challenges limiting their responses to strong winds were economic – on the one hand unaffordability of building materials and on the other context a lack of funds. The findings are in line with what was highlighted by Smit and Wandel (2006), namely that in some instances households fail to respond to the impacts of strong wind due to constraints related to access to resources. This is a common occurrence in areas occupied by vulnerable communities such as informal settlements. The finding further underlines the fact that access to economic activity plays a role in how households cope and adapt to extreme weather events such as strong winds.

Table 6.1: Actual household responses to strong winds

<b>Actual household responses related to the dwelling</b>				
<b>Action</b>			<b>Freedom Charter</b>	<b>Msawawa</b>
Repair the dwelling			64%	82%
Loan funds to repair dwelling			13%	0%
Sleep at the Community centre			2%	0%
Sleep at neighbours places			2%	3%
Put stones on the roof			1%	15%
<b>Household responses related to damaged moveable property</b>				
<b>Action</b>			<b>Freedom Charter</b>	<b>Msawawa</b>
Dispose damaged moveable property			2%	5%
Repair damaged moveable property			1%	3%
Replace damaged moveable property			9%	2%

Despite the limitations that households reported in the survey, they also reported plans on how to deal with the impacts of strong winds on their dwellings in future. Those affected in Freedom Charter indicated that they would like to respond to strong winds in future through coping mechanisms such as maintenance of their dwellings and using stronger building material such as better second-hand corrugated iron instead of plastic, placing stones or concrete blocks on the roof in advance of a wind storm and using tent material for roofing (this cannot be effective in protecting the dwelling from strong winds). Respondents (4% of the households affected by strong wind) in Freedom Charter reported that in future they intend to respond to the challenge of damaged household goods through insignificant means such as replacing damaged furniture, stopping to buy any furniture as a replacement.

Households in Msawawa also identified an array of planned coping responses (see Table 6.2) in relation to strong winds. The preference for households is to place stones on the roof, to repair the shacks with better material such as second-hand corrugated iron that is still in better condition and to use tent material. In Msawawa, the planned coping response was replacing the damaged household goods, while the adaptation option was putting up walls to protect the dwellings. Planned household responses to strong winds in Freedom Charter and Msawawa pointed to some form of limited adaptation. As I explained in Chapter 3, this view is supported by Hay and Mimura (2006) who explained that improving adaptive capacity involves avoiding risk, sharing risk and reducing the chance of an event happening. Households in Freedom Charter identified the following adaptation options: growing trees (16%) that could reduce their vulnerability to strong winds and building wind barriers using corrugated iron (14%). Planned responses such as planting of trees, using stronger material for the dwelling and building a wind barrier constitute a form of anticipatory adaptation identified by Chishakwe et al. (2012), reviewed in Chapter 3. Households in Msawawa on the other context did not have any planned adaptation options. The planned adaptation responses in Freedom Charter, such as growing trees, show that households are aware that the surrounding environment does not protect them and that it needs to be improved to reduce vulnerability. While these households did not seem capable of executing these plans, their responses suggest that household awareness of the surrounding environment is a key driver of adaptive capacity. Furthermore, the actual and proposed future plans are also mainly coping rather than adaptive in nature, except the proposed construction of corrugated iron walls to protect dwellings in Msawawa and the planting of trees in Freedom Charter that has the potential of addressing household vulnerability to strong winds in future. Approximately 40% of the households in the two settlements do not have any plans on how to respond to strong winds and this is due to limited access to income and inability to build better dwellings.

Table 6.2. Planned household responses to strong winds<sup>17</sup>

Action	Freedom Charter	Msawawa
Rebuilding shacks with better second-hand corrugated iron material	35%	19%
Putting stones/concrete blocks on the roof	14%	22%
Using tent material to strengthen the shacks	6%	6%
Replace damaged furniture	2%	3%
Stooping to buy furniture	1%	0%
Building walls to protect the dwelling	0%	2%

Overall, the findings on strong winds show that households are mainly relying on coping mechanisms that involve the repairing of shacks and not the building of stronger dwellings. My empirical research points out that households' responses to strong winds in the two settlements vary considerably and the most significant revolves around repairing dwellings (73% in the two settlements) compared to putting stones on the roof (8%) and accessing loans for rebuilding (7%). A limited factor is how actual households' responses to strong winds are the sourcing of assistance mainly on repairing the dwellings with help from friends, neighbours and relatives. To an extent, this shows that there is limited social capital contributing to households' ability to cope with strong winds.

There is a difference between households affected by strong winds and their responses to strong winds. As noted in Chapter 5, 44% of the households were negatively affected by strong winds. Interestingly, 55% of the affected households have planned responses related to strong winds compared to 91% of actual responses. This means that 56% of the households negatively impacted by strong winds have no plans on how to respond to strong winds. This is due to constraints such as limited access to income and failure to make improvements on the dwelling that could help in reducing vulnerability. Furthermore, the higher number of households with no planned responses to strong winds shows that

<sup>17</sup> Note that the responses overlap and do not add have to add to 100%.

household responses to strong winds are reactive in nature. There are also limited anticipatory mechanisms that households identified, such as planting trees and constructing wind barriers that could help in reducing household vulnerability to strong winds in the two settlements. These could help in adapting but as indicated in the findings this is constrained by limited household access to resources such as finance, as discussed in Chapter 5. Furthermore, as noted by Adger (2003) and discussed in the literature review, collective actions and decision-making is important in improving adaptation to climate change in particular. Therefore, it is important when households work together in addressing challenges related to strong winds. Assistance from outside stakeholders can also help in improving household adaptive capacity by providing resources that could help in building better dwellings that can endure strong winds. These insights are picked up again in Chapter 7, which deals in more detail with governance as it relates to these challenges.

### **6.2.2. Responses to extreme temperature and related events**

Extreme cold and heat are seasonal challenges that households in Msawawa and Freedom Charter deal with every year. As mentioned in the previous chapter, related to extreme cold is also the challenge of fires that are a result of energy sources such as paraffin used by households. Further, the fact that the dwellings in Msawawa and Freedom Charter are predominantly made of zinc and plastic means that ventilation is limited, thus allowing for the build-up of moisture. These dwelling materials also contribute to the fluctuation of temperature inside (it can easily get extremely hot or cold), making it difficult to adequately respond to events such as extreme heat and cold.

#### ***6.2.2.1. Responses to extreme heat and cold***

Household responses to heat and cold in the two settlements over the past ten years have varied from household to household and more so in Freedom Charter than in Msawawa. Broadly, the main responses to these extreme temperatures



were mainly on coping with the health impacts (44%) and reducing the negative impact on food in the household (8%). In particular, the household responses related to heat and food is something that was revealed by the study and I did not pick it up in the literature review conducted for Chapter 3.

Interestingly, the actual responses show that households in Freedom Charter put more efforts into responses to extreme heat (64% note that in some instances households may have more than one response) compared to cold or extreme cold (59%). Before conducting the survey, I assumed that households in Freedom Charter would be more responsive to extreme cold rather than heat because literature pointed out that the southern part of the City of Johannesburg where Freedom Charter is located is considered relatively colder (Storie, 2014). The empirical findings further revealed that when looking at actual responses to extreme heat and cold, households in Msawawa are more concerned about extreme cold (69%) compared to extreme heat (45%). The higher actual responses to extreme cold in Msawawa correspond with the findings in Chapter 5 that the impact of extreme cold on households was ranked slightly higher (78%) compared to heat (75%). This may have to do with microclimatic conditions of Msawawa's location not covered in the broad trends that Storie (2014) comments on. Notably, the responses to extreme heat mainly relate to escaping the heat and mitigating the consequences thereof. Significantly, household responses to extreme heat and cold were coping, complemented by weak adaptation efforts.

The actual responses to extreme heat reported in Freedom Charter were in the form of coping strategies. These coping strategies were related to the use of the dwelling, namely leaving the dwelling (see Table 6.3), doing nothing, ventilating the dwelling by opening doors and windows and in the case of one of the old houses, repairing ceilings. Some responses were related to mitigating the discomforts and health consequences of extreme heat. These responses involved taking household members who get sick to hospital, drinking lots of water, using mosquito repellents (given that the mosquito burden was experienced as highest on the hottest days), buying medication to mediate heat-related discomfort and

buying sunscreen lotions. Other coping responses were related to food, namely limiting the cooking of food (presumably because of the indoor heat accumulation), throwing away spoiled food, buying food that does not require refrigeration and eating fast food (so as to avoid having to store food).

In Msawawa, the coping responses to extreme heat were less diverse, and a considerable amount (approximately 40%) of households had no planned responses. The most common response was to sit outside of the dwelling, and the second most common response was to buy mosquito coils and mosquito nets. In relation to food, the responses were throwing away spoiled food and limiting the amounts of food cooked so as to prevent having to store left-overs.

Table 6.3: Actual household responses to extreme heat

Action	Freedom Charter	Msawawa
Going outside the dwelling when it is hot	41%	26%
Buy mosquito nets and coils	0%	11%
Doing nothing	6%	0%
Limit the cooking of food	4%	3%
Ventilating the dwelling by opening doors and windows	2%	0%
Taking sick household members due to heat to hospital	2%	0%
Throw spoiled food	2%	5%
Drinking water	1%	0%
Using sunburn lotion	1%	0%
Buy food that does not require refrigeration	1%	0%
Repair ceiling	1%	0%

Only one of the survey respondents in Freedom Charter indicated how they would have wanted to respond to challenges of heat in the past ten years. This suggests

that they felt powerless in relation to addressing this challenge. However, it may also be that the question was not well understood. The one household in Freedom Charter that reported a planned response in the past ten years indicated that it wanted to buy a refrigerator that could be used to cool water needed when it is hot (there are informal electricity connections in Freedom Charter, unlike in Msawawa).

Households in Freedom Charter predominantly identified planned coping responses related to extreme heat (see Table 6.4). In terms of reported plans for future responses, households in Freedom Charter reported the following coping plans: putting a cover over the house such as plastic (this was not a conclusive response, as plastic is likely to increase the heat, but presumably the intention was to create shade) and staying under trees during the day when it is extremely hot. Other plans were to buy electrical fans (using a generator for power) and fly traps. In relation to food, the planned responses included cooking small amounts of food, and buying food that does not require refrigeration. Planned responses that can be categorised as adaptation were weakly represented in the responses, and these are building a veranda, insulating roofs, putting ceilings into the dwellings and applying for a low-cost house.

Planned coping measures and limited adaptation were identified in Msawawa as forms of responses to extreme heat (see Table 6.4). Households in Msawawa (82%) had more plans to respond to heat as compared to Freedom Charter (18%). This is attributed to the fact that shacks in Msawawa are smaller and more compact, making it harder to escape the outdoor heat. Eighty-two percent of households in Freedom Charter had no plans to respond to extreme heat compared to 18% in Msawawa. In Msawawa, the planned coping responses to extreme heat were placing a plastic cover on the house (similarly inconclusive), using curtains to prevent sun penetration into the dwelling, buying food that does not require refrigeration, and buying insecticides (related to mosquitos). These responses mainly constitute coping mechanisms, but there are those that show some form of planned adaptation, and they are application for low-cost housing (intention),

putting up verandas and planting trees. All of these were reported by a negligible percentage of the surveyed households. Fifty-eight percent of the respondents in Msawawa reported not having had any planned responses over the past ten years. Limited planned adaptation responses identified were applying for a low-cost house, the planting of trees and extending shade areas on dwellings. Reports of assistance in response to extreme heat were low both in Freedom Charter (1%) and Msawawa (2%). In these instances the assistance was reported to be from the municipality.

Table 6.4. Planned household responses to extreme heat

<b>Action</b>	<b>Freedom Charter</b>	<b>Msawawa</b>
No plan	0%	58%
Put plastic cover over the roof	6%	9%
Constructing a veranda	1%	3%
Planting trees		2%
Prevent the sun entering the dwelling through curtains	0%	2%
Buying food that does not require refrigeration	2%	2%
Buying insecticides	0%	2%
Extending shade areas on the dwelling	0%	2%
Stay under a tree	5%	0%
Buy fan and fly trap	2%	0%
Putting a ceiling	1%	0%
Apply for low-cost house	1%	2%

Households in the two settlements reported using various creative coping means to respond to extreme cold with very limited adaptation efforts. As noted in Chapter 5, these households constitute 78% of those affected in the two settlements. The most significant response of households in Freedom Charter to extreme cold in the past ten years was burning charcoal and wood (see Table

6.5). The other responses were diverse and weakly represented: wearing warm clothes, staying indoors, sleeping together to keep warm and increasing budgets for buying fossil fuels (*i.e.*, coal). A health related response was visiting clinics and buying medication (when affected by flu) (5%). Insignificant adaptation responses identified in relation to extreme cold were the use of more blankets, using paraffin stoves and buying heaters.

Similarly in Msawawa, responses to extreme cold were mainly coping mechanisms and limited adaptation (see Table 6.5). The most common response was the burning of charcoal/wood. This was followed by wearing warm clothes, using more blankets and visiting clinics (buying medication). Other responses were using paper to block holes on the dwelling (*i.e.*, newspapers) and using plastic bottles with warm water. The responses were all in the category of coping, with the exception of using paraffin stoves, purchasing of gas or paraffin heaters, postponing household chores until it is warmer, which were weakly represented in this sample.

Table 6.5: Actual household responses to extreme cold

<b>Action</b>	<b>Freedom Charter</b>	<b>Msawawa</b>
Burning charcoal/wood	44%	33%
Using more blankets	14%	0%
Wearing warm clothes	4%	19%
Staying indoors	0%	0%
Sleeping together in one place	0%	0%
Buying more fuel ( <i>i.e</i> paraffin)	0%	0%
Visit clinics and buy medication from pharmacies	5%	11%
Use papers to block holes on the dwelling	2%	0%
Buy gas or paraffin heaters	0%	2%
Postpone household chores until it is warmer	0%	2%
Use warm plastic bottles at night	0%	2%

Reported plans on how to respond to extreme cold in future by households in Freedom Charter were the following, mainly coping, actions complemented by limited adaptation. The coping efforts were buying warm clothes, temporarily moving out of the settlement and using cheaper fuels such as paraffin (See Table 6.6). Planned responses also revolve around the burning of fuels such as gas. Limited adaptation efforts in Freedom Charter that were identified included buying paraffin or gas heaters and requesting the City of Johannesburg to provide electricity.

Similarly in Msawawa planned responses were mainly coping efforts. These efforts were buying warm clothes (See Table 6.6), temporarily moving out of the settlement and using medication. Limited planned adaptation efforts in Msawawa were buying a paraffin/gas heaters and building a fireplace. Households both in Msawawa and Freedom Charter indicated that there is no difference between how they have planned to respond in the past ten years and how they actually responded to extreme cold.

Table 6.6: Planned household responses household responses to extreme cold

<b>Action</b>	<b>Freedom Charter</b>	<b>Msawawa</b>
Buying paraffin of gas heater	11%	17%
Buying warm clothes	9%	8%
Request the municipality to provide electricity	2%	0%
Moving out of the settlement	1%	2%
Using cheaper fuels such as paraffin to heat the dwelling	1%	0%
Burning fuels such as gas	1%	0%
Build a fireplace	0%	8%
Using medication for diseases such as flu	0%	2%

Broadly, the above responses are also mainly coping mechanisms, but there are limited anticipated adaptation measures. As noted in Chapter 5, approximately 75% were negatively affected by extreme heat and 78% were negatively affected by extreme cold. Notably, 31% of the households affected by extreme cold had plans to respond, whilst it was 50% in relation to extreme heat. The findings show that households are putting more efforts in addressing their vulnerability to extreme heat as compared to extreme cold. The limited efforts related addressing extreme cold could be attributed to the fact that addressing extreme cold could require investment in blankets, clothing and fuels such as coal, which require financial resources that are not readily available. The most significant actual responses to extreme cold were the use of fossil fuels such as coal and wood (38%), compared to the use of clothes (12%) and visiting the clinic for treatment of cold related ailments (8%) (see Table 6.6 above). The limited adaptation measures that were identified in Freedom Charter were covering walls with extra materials such as ceiling boards (1%), while in Msawawa this involved the anticipated move to low-cost housing and building stronger dwellings. The significant coping responses that households identified as relating to responses to extreme cold in the two settlements were the burning of coal/wood, followed by the use of clothes and blankets to keep warm. There were limited and weak adaptation measures that households identified for responding to extreme cold. As noted in the above discussions on extreme heat, Freedom Charter (8%) households receive more assistance for responding to extreme cold from various organisations compared to Msawawa (3%). These findings show that households are aware that in order to adapt to extreme heat and cold they need to improve the nature of their dwellings. Considering the socio-economic conditions discussed in Chapter 6, households in the two settlements do not seem to have the capacity to improve their dwellings to reduce vulnerability to extreme heat and cold in the near future. Therefore, the possibility for the households to adapt to extreme heat and cold remains constrained.

### 6.2.2.2. Responses to Fire

Spatial agglomeration of shacks in informal settlements hamper household responses to fires that occur mainly in winter due to the use of various energy sources such as coal (Murray, 2009). Households in Freedom Charter have responded to fire disasters through coping approaches such as calling the fire brigade (see Table 6.7), rebuilding burnt structures (dwellings), putting out the fire with the help of the community, sending the injured members to hospital. Other responses identified by the households were buying belongings to replace those destroyed by the fire, going to court to report culprits of the fire, and sleeping outside. Limited adaptation efforts identified were stopping illegal electricity connections and relocation (assuming this would be to less fire prone areas).

Responses in Msawawa to fire were mainly coping mechanisms and weak adaptation measures, as was the case for strong winds, extreme heat and cold. In Msawawa, households responded to fire through mechanisms such as rebuilding shacks, putting out the fire, moving out/relocation of the shacks (see Table 6.7), using community meetings to address the challenge, providing food parcels, sending injured people to hospital, buying new belongings, providing building material to the victims and providing shelter (to affected households). Some of the households responded by minimising the use of hazardous fuels such as paraffin. Insignificant adaptation measures identified were separating a shack from that of neighbours' (*i.e.*, increasing the distance between the shacks), stopping people from burning things near the dwellings (this is preventative) and rebuilding the dwellings using bricks (this study did not identify the percentage of such efforts). The increase of distance between shacks could be achieved in limited instances only because of the challenge of density that I observed during the survey in Msawawa. It should be noted that the Msawawa leadership had outlawed informal electricity connections in the settlement prior to my interviewing, therefore this particular coping strategy was not mentioned in the household responses in this settlement (unlike Freedom Charter).



Table 6.7: Actual household responses to fire

<b>Action</b>	<b>Freedom Charter</b>	<b>Msawawa</b>
Calling the fire brigade	15%	0%
Rebuilding burnt structures (dwellings) with similar material	13%	8%
Putting out the fire with the help of the community	11%	5%
Replace those destroyed by the fire	2%	0%
Going to court to report culprits of the fire	1%	0%
Sending the injured members to hospital	1%	2%
Stopping illegal electricity connections	1%	0%
Relocation	1%	3%
Use community meetings to find solutions	0%	3%
Provide food to those affected	0%	3%
Buy new belongings	0%	2%
Providing building material to the victims	0%	1%
Providing shelter (to affected households)	0%	1%
Minimising the use of hazardous fuels such as paraffin	0%	1%
Separating a shack from that of neighbours'	0%	1%
Stopping people burning things near the dwellings	0%	3%

Households in Freedom Charter intend to prevent fire disasters through further coping strategies. These were using less hazardous fuels for warmth in winter and rebuilding dwelling structures (See Table 6.8). Planned adaptation actions were monitoring the use of fire in the settlement, avoiding illegal electricity connections and separating the dwellings from those of neighbours.

In Msawawa, households plan to cope with fire disasters through various ways. Households plan to help others in putting out the fire, and putting off stoves before leaving the dwelling/going to sleep. Limited planned responses identified above that are considered adaptation were separating shacks from the neighbours and monitoring the use of fire in the neighbourhood. The findings also showed that there is anxiety among a small percentage of the surveyed households. In support of this, households in Freedom Charter mentioned that they are always worried about children being liable to start fires (1%), while some in Msawawa stated that they are always afraid that neighbours have left their stoves (especially those made for the use of coal in winter) burning even when sleeping (2%). The use of coal and paraffin stoves is considered to be some of the causes of fire in the settlements.

Table 6.8: Planned household responses to fire

<b>Action</b>	<b>Freedom Charter</b>	<b>Msawawa</b>
Monitoring the use of fire in the settlement	2%	0%
Using less hazardous fuels for warmth in winter	1%	0%
Rebuilding dwelling structures	1%	0%
Avoiding illegal electricity connections	1%	0%
Separating the dwellings from those of neighbours	1%	5%
Putting out the fire	0%	26%
Monitoring the use of fire in the neighbourhood.	0%	5%
Putting off stoves before leaving the dwelling/going to sleep.	0%	2%

Households in Msawawa and Freedom Charter are committed to addressing the challenge of fire. As explained in Chapter 5, 17% of the households were affected by fire in the two settlements. The findings revealed that an approximately 22% of

those affected by fire had plans to respond in future. Interestingly the findings reveal that out of the households that were affected by fire, there are more households that have planned to respond to fire in Msawawa (38%) compared to Freedom Charter (6%). This study could not establish the reason for this variation but the higher planned responses in Msawawa can be attributed to the fact that there may have been more incidents of fires there. Further, the findings show that 78% of the households affected by fire in the past ten years have no plans to respond to fire. The above findings on fire also reveal that households mainly rely on coping mechanisms to respond to fire. In overall, the most preferred coping responses were rebuilding the shacks (without necessarily improving them) (11%), putting out the fire (8%) and calling the fire brigade to assist (8%). Overall the findings on fire also show similar trends to that of extreme heat and cold because households in the two settlements mainly rely on coping mechanisms. There are insignificant adaptation actions that were identified in the two settlements. This may be attributed to the fact that fires are also accidental in nature and it is difficult for households in informal settlements to effectively plan for them considering the space limitations and other challenges such as access to better land where they can build their shacks.

### **6.2.3. Responses to precipitation related extreme weather events**

Events related to heavy precipitation, as discussed in Chapter 5, pose severe challenges for households in Msawawa and Freedom Charter. These responses can be mainly classified as coping mechanisms of which a significant number involves the repair or minor modification of the dwellings. There are limited planned adaptations that have been identified and which include applications for low-cost housing. In contrast, Freedom Charter is close to low to middle class townships such as Eldorado Park (mainly Coloured) and Soweto (mainly black). Before the study, my assumption was that Msawawa is well supported by the surrounding upmarket suburbs but this is not supported by the analysis of my findings.

### ***6.2.3.1. Responses to heavy downpours and hailstorms***

Households in Msawawa and Freedom Charter rely on various coping mechanisms to respond to heavy downpours and hailstorms. These responses to downpours in Freedom Charter and Msawawa are illustrated in Table 6.9. The responses by households affected by heavy downpours in Freedom Charter and Msawawa portray a situation where there is heavy reliance on coping mechanism which have no impact on the underlying causes of vulnerability to heavy downpours (*i.e.*, having weak dwellings, no income, *etc.*). The findings further reveal that in the two settlements households' actual responses to heavy downpours (68%) are higher compared to hailstorms (29%), floods (22%) and droughts (6%). The level of responses proportionally ties up with the findings on the impacts of precipitation on household related events discussed in Chapter 5. Insights from the empirical findings were that on average in Msawawa and Freedom Charter households were mostly affected by heavy downpours (73%) compared to hailstorms (50%), floods (18%) and drought (14%). The fact that households in the two settlements spend more efforts responding to heavy downpours is due to the fact that they are more vulnerable to it because it happens more frequently during the summer season.

Households in Freedom Charter responded to heavy downpours through various coping means. The actual coping responses to heavy downpours (mainly related to the dwellings in Freedom Charter) were using buckets and mopping up water, repairing the shacks, temporarily leaving the shack, opening drains, covering belongings with plastic, removing belongings, drying clothes and changing entrances to the dwellings. Furthermore, households in Freedom Charter plan to respond to heavy downpours in future through coping mechanisms such as the repairing of roofs, covering furniture, digging trenches, using bricks to balance the roof and evacuating the dwelling during heavy rains. Other planned coping responses were, buying more corrugated iron and using plastic to cover roof. Insignificant adaptation responses were changing dwelling entrance direction so

that the entrance does not face the rainfall direction and water cannot come easily into the dwelling through the door and elevating the shack floor (in some instances using rocks to block water from heavy rains as shown in Figure 6.1).



Figure 6.1: Rocks used for blocking water from entering the dwellings (also used for making the place less muddy after rains) (Source: Mpho Nenweli, March 2013)<sup>18</sup>

Households in Msawawa responded to heavy downpours mainly through coping measures and limited adaptation. In Msawawa, coping responses to heavy downpours (see Table 6.9) were using buckets and mopping up water, covering belongings with plastic, drying the clothes, repairing the shacks, opening blocked drains, temporarily removing belongings and buying furniture. Future coping plans to respond to heavy downpours in Msawawa were repairing roofs, covering

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<sup>18</sup> The community of Freedom Charter successfully conducted litigation against the City of Johannesburg to get these households internally relocated to a temporary place called New Marikana. This happened a year after my survey.

furniture, evacuating the place during rains, and buying more plastic to cover the roof.

Table 6.9: Actual household responses to heavy downpours

<b>Action</b>	<b>Freedom Charter</b>	<b>Msawawa</b>
Using buckets and mopping up water	39%	35%
Covering belongings with plastic	19%	14%
Repair roof	13%	19%
Drying the clothes	6%	6%
Repairing the shacks	4%	19%
Digging trenches	2%	0%
Elevating the shack floor	2%	0%
Using bricks to balance the roof	1%	0%
Using plastic to cover roof	1%	2%
Buying more corrugated iron	1%	0%
Evacuating the dwelling during heavy rains	1%	2%
Changing dwelling entrance direction so that the entrance	1%	0%
Opening blocked drains	0%	3%
Temporarily moving belongings to a safer place	0%	3%
Evacuating the place during rains	0%	2%
Buying more plastic to cover the roof	0%	2%

Households in the in Freedom Charter and Msawawa have limited plans aimed at dealing with heavy downpours. These planned responses also illustrate a situation where the household only intend to apply coping mechanisms to address exposure to heavy downpours while digging trenches outside dwellings (2%) was the only listed adaptation option. Other limited potential adaptations options identified by households in Freedom Charter were applying for a low-cost house (4%), building

a better shack (2%), building concrete walls around the dwelling (2%) and finding another place to stay (1%). Similarly, in Msawawa adaptation responses were applying for low-cost housing (3%), building shacks on concrete foundations (3%) and making verandas (2%).

During summer households in Msawawa and Freedom Charter have to contend with hailstorms that negatively impact on households. Households in Freedom Charter and Msawawa are adversely affected by hailstorms that mainly cause damage to dwellings and household belongings. Households in Freedom Charter responded to hailstorms through coping strategies such as mopping up water in the dwellings (see Table 6.10), using coal fires, covering belongings with plastic, putting bricks on the roof, covering roofs with tent material, repairing shacks, removing belongings and using blankets to keep warm.

Similarly, households in Msawawa also planned to respond to hailstorms through coping strategies. These were the mopping up of water (see Table 6.10), using coal fires, using blankets to keep warm, covering roofs and windows with plastic, using sticks to elevate the roof, covering belongings with plastic and temporarily moving out of the dwelling.

Table 6.10: Actual household responses to hailstorms

Action	Freedom Charter	Msawawa
Mopping water	22%	14%
Using coal fires to warm up	4%	3%
Using blankets to keep warm	0%	3%
Covering belongings with plastic	2%	3%
Use sticks to elevate roof	2%	1%
Putting bricks on the roof	1%	0%
Covering roofs with tent material (1%)	1%	0%
Repairing shacks (1%)	1%	0%
Removing belongings (1%)	1%	0%
Using blankets to keep warm (1%)	1%	0%

Relocating temporarily	0%	1%
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Households in Freedom Charter and Msawawa plan to respond to hailstorms in future through coping strategies. These were mentioned as being mopping up water (14%), repairing the shacks (8%), covering belongings with plastic (3%), removing ice from roofs (3%), using coal fires (3%), using sticks to reinforce the roofs (2%) and temporarily moving out of the house (2%). Further, households in Msawawa and Freedom Charter indicated there was no difference in how they wanted to respond to hailstorms and how they actually responded. Limited planned adaptation was identified in Freedom Charter that involved moving dwellings to a safer place (5%) in the settlement (this was not a very clear response in relation to heavy rain and hailstorms).

The overall findings on heavy downpours and hailstorms show similar coping responses. In Chapter 5, it was noted that households were more vulnerable to heavy downpours (78%) as compared to hailstorms (50%). Approximately nine percent of the households affected by heavy downpours have plans to respond in future. A significant 91% of the households affected by heavy downpours have no plans to respond, and this is attributed to lack of resources to improve their dwellings and surrounding environment. The most significant responses used by households to respond to heavy downpours were the mopping up of water in the dwellings (39%), followed by repairing the dwelling (9%) and covering belongings with plastics (8%). The findings also showed that an approximately 20% of the households affected by hailstorms have plans to respond in future. Therefore, 80% of the households do not have any plans and this shows that households have somehow acknowledged that they have limited means to address this challenge. On hailstorms, the most significant responses were mopping up water (18%) compared to repairing shacks (8%). Weak adaptation measures being taken by households were identified and these were accessing low-cost housing, relocating and building better dwellings that could endure hailstorms.



### ***6.2.3.2. Responses to Floods***

Freedom Charter and Msawawa continuously experience flooding almost annually during the rainy season. Responses to flooding by households in Freedom Charter were coping strategies such as temporarily evacuating the affected shacks (see Table 6.11), mopping up water, repairing the shacks, replacing belongings, drying of belongings that were wet, and climbing on roof tops to be safe.

A mix of insignificant coping and adaptation responses to floods were identified in Msawawa. These responses were mopping up water (see Table 6.11), building a stoep around the building, and relocating temporarily. In the listed responses there were some form of adaptation measures in Freedom Charter and Msawawa such as building other shacks in less vulnerable places, building a concrete line around the shacks, and using sand bags to block water (see Figure 6.2) (although if this is not effective it could be a coping mechanism). As I noted in Chapter 3, Chishakwe et al. (2012) indicated that responses such as these remain weak responses because in some instances the dwellings would not be able to withstand flooding because of their location or structural make-up. Households further indicated that there is no difference on how they wanted to respond and how they actually responded to floods.



Figure 6.2: Sand bags being used to block water (Source: Mpho Nenweli, March 2013)

Table 6.11: Actual household responses to flood

Action	Freedom Charter	Msawawa
Temporarily evacuating the affected shacks	13%	4%
Mopping up water	9%	4%
Repairing the shacks	3%	0%
Replacing belongings	2%	0%
Drying of belongings that were wet	1%	0%
Climbing on roof tops	1%	0%
Building other shacks in less vulnerable places	0%	5%
Building a concrete line around the shacks	0%	4%
Build stoep to block water	0%	2%
Moving out of the place	0%	2%
Using sand bags to block water	0%	1%

Households have various creative ways aimed at responding to their vulnerability to floods. Planned coping responses to future flooding in Freedom Charter that were listed by households were: putting stones/bricks around the dwelling (4%), digging trenches around the shacks (3%), using sand bags (1%), building stoeps (1%), using plastic to cover roofs (1%), replacing roofs (1%) and plastering the houses (1%).

Planned responses in Msawawa were putting bricks/stones around the dwelling (2%), applying for low-cost housing (2%) and digging a trench (2%). These planned responses do not differ much from the actual responses. Households are constrained by access to resources that could help them adapt to floods. Their plans to respond to floods are coping mechanisms. Planned adaptation measures identified by the households in Freedom Charter were applying for low-cost housing (6%) and relocation to places that are not vulnerable to flooding (3%). Shai (Mr. Shai, interview, 23 May 2013) in the in-depth interview also expressed the following on flooding in Freedom Charter Square:

That [flooding] is a sensitive issue that we might not see it the same way. That is where the government should also come in. Government is distancing itself. In the recent floods, no government official came, no Ward Councillor and no Mayor; and only media was there. People lost belongings and lives. Every time we have floods we lose lives and belongings. Even when government happens to come they only give people groceries. You cannot sleep in grocery plastics. We don't need food we need houses. You cannot sleep in a bag of mealies.

The overall findings on floods show that households mainly rely on coping mechanisms to respond to flooding challenges in Freedom Charter and Msawawa. As stated in Chapter 5, approximately 18% of the households were affected by flooding in the two settlements. Fourteen percent of those affected by floods had planned responses aimed at addressing their vulnerability. Therefore, 86% of the households had no planned responses related to addressing flooding. This further

shows the level of powerlessness from the households that are located within the floodlines in the two settlements. These households have limited choices and means of addressing flooding of their dwellings and they have learnt to live with flooding disasters. The most significant responses are the evacuation of dwellings during floods (13%), followed by mopping up water (7%) and the repair of dwellings (3%). Identified planned adaptations included relocating to places that are not vulnerable and applying for low-cost housing. Generally, the findings do not reveal much beyond social capital in terms of actual resources that could be used to cope with flooding. Potentially, households identified resources such as land in better areas (out of the flood line) and low-cost housing as being important in enabling them to adapt to flooding.

#### ***6.2.3.3. Responses to Drought***

As discussed in Chapter 5, drought is not a major concern to households in Msawawa and Freedom Charter. The few households in Freedom Charter that indicated during the survey that they were affected by drought indicated that they responded through coping mechanisms such as looking for work (4%), asking for food from neighbours (1%), using traditional foods (1%), growing vegetables (1%) and borrowing money (1%). Households in Msawawa responded by engaging in coping activities such as self-employment activities (2%) and selling used clothes (1%).

Households in Freedom Charter indicated that in future they will respond to drought through coping activities such as starting businesses (see Table 6.12), looking for work, borrowing money, asking for food from friends and neighbours, eating traditional foods, growing sweet potatoes and maize (this is only possible in some parts of Freedom Charter). Similarly, households in Msawawa (see Table 6.12) plan to respond through coping activities such as looking for employment and starting businesses. Households indicated that there is no difference in terms of how they responded to drought and how they had planned to respond. The above actual and planned responses show that the households are not necessarily

engaging in agriculture. During the survey it was found that some of the households in Freedom Charter had small areas where they were planting vegetables on the periphery of the settlement, while Msawawa had no space for such activities. The above identified responses also show that the impact of drought on them is mainly indirect because they are not engaged in any serious form of farming (*i.e.*, subsistence or commercial).

Table 6.12: Planned household responses to drought

<b>Action</b>	<b>Freedom Charter</b>	<b>Msawawa</b>
Starting businesses	4%	4%
Looking for work	4%	14%
Borrowing money	1%	0%
Asking for food from friends and neighbours	1%	0%
Eat traditional foods	1%	0%
Growing sweet potatoes and maize (this is only possible in some parts of Freedom Charter)	1%	0%

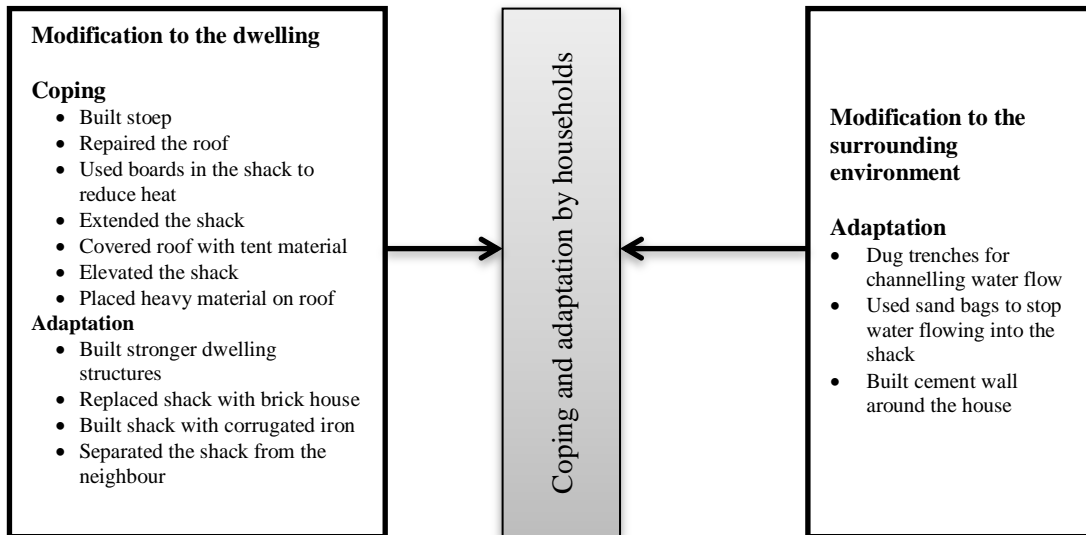
Overall, going beyond the issue of drought, the findings on household responses to extreme weather events discussed above proved that households in Msawawa and Freedom Charter spend more efforts in responding to strong winds (92%) compared to heavy downpours (68%), extreme cold (64%), extreme heat (55%), hailstorms (29%), fire (23%), floods (22%) and drought (6%). Furthermore, the most significant planned responses were related to strong winds (55%) compared to extreme cold (29%), heavy downpours (21%), fire (21%), extreme heat (18%), hailstorms (16%), drought (15%) and flooding (12%).

### **6.3. Modification of dwellings and surrounding environments by households as a response to extreme weather events**

The establishment of urban areas involves the modification of the environment, damming of rivers, loss of vegetation and siltation of rivers (Pelling, 2003). The modifications are attributed to actions for enabling the establishment of the urban areas and sometimes this can also be in response to particular disasters. The findings show that households in Msawawa and Freedom Charter have made efforts to modify the surrounding environments and dwellings. Fifty-eight households in Freedom Charter indicated that they have modified either their dwellings or surrounding environment to respond to extreme events, compared to 35% in Msawawa. Although households did not have to agree on the need and ways to modify their dwellings and surroundings, the majority of them are doing so in Msawawa and Freedom Charter Square. The households also combine efforts in helping to create some form of collective actions that are essential for coping with emanating changes, including those that are due to climate change. The modification of dwellings and surroundings by households in the two informal settlements further shows the creative nature of households in responding to climate change. It further shows that they are continuously responding to changes in the internal and external environments.

The modifications that households have made to their dwellings and external environments are listed in the following diagram (Figure 6.3). These modifications can mainly (except for the repair of the roof) be classified as adaptations that households have undertaken to respond to extreme weather challenges. These responses were mainly aimed at improving the safety of dwellings.

Figure 6.3: Modifications of dwellings and surrounding environment by households in Msawawa and Freedom Charter



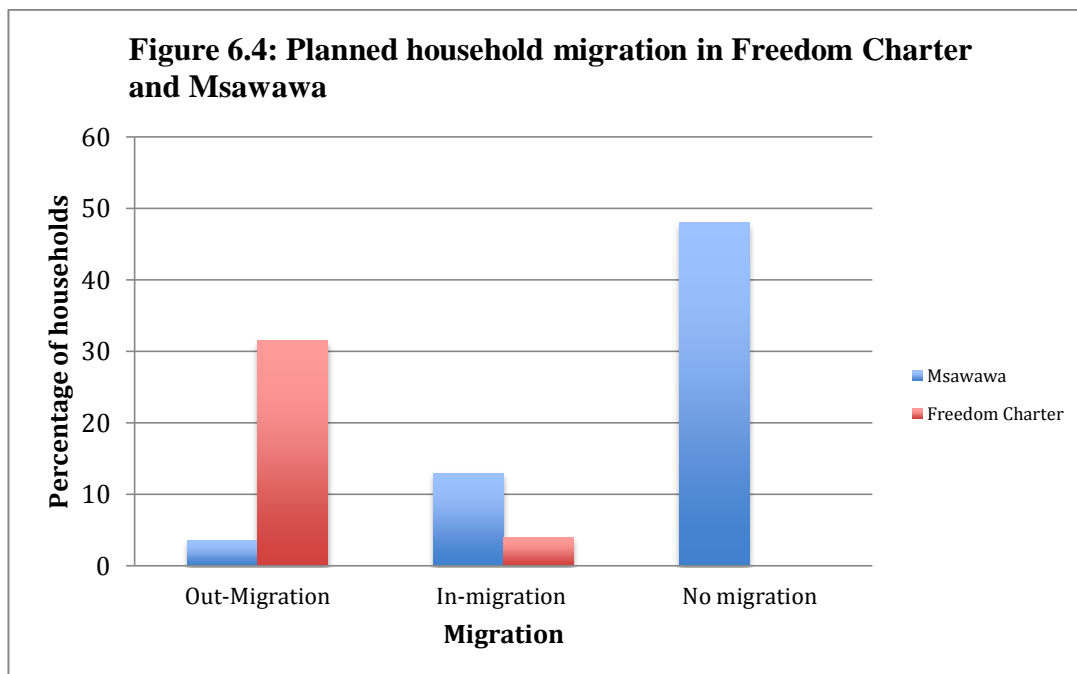
#### 6.4. In-migration and out-migration as a coping mechanism

In-migration plays an important role in the nature of demographics in Freedom Charter and Msawawa. Twenty-three percent of the respondents in Freedom Charter, compared to 31% in Msawawa indicated that they have household members, friends or relatives who are planning to come for long-term stays with them from other areas for reasons that included studying, looking for work and staying together. These planned moves into urban places (such as Msawawa and Freedom Charter Square) may have been climate variability and change induced (Hope, 2009). Seventeen percent of the respondents indicated that they have household members who have come to stay long-term with them from other areas in the past ten years. As stated in the literature review in Chapter 2, the GCRO (2012) analysis is that in 2011 the City of Johannesburg had approximately 30% of in-migrants from other parts of South Africa and approximately nine percent were cross-border migrants. It was also corroborated by McGregor (1994), who found that informal settlements are used to access economic opportunities in urban areas by people who are sometimes forced to leave their homes due to challenges such as poverty, unemployment, droughts, food shortage and others (UNFPA, 2007). The consequences of the in-migration on the informal

settlements were limited access to land, high population density and no infrastructure. This contributes to households living lives that are vulnerable to events such as fires and disease (*ibid.*).

The review of literature on migration in Chapter 3, pointed out that out-migration is also considered to be an important element of coping with climate change (SSA, 2006; Vincent et al., 2013). Literature also highlighted that it is a key contributor to the emergence and growth of urban areas, including informal settlement areas (Atkinson & Marais, 2006; Makhulu, 2010; Misselhorn, 2008). The review further indicated that mobility, together with the natural increase of population is key in the shaping of informal settlements (Hope, 2009). This study's survey findings showed that 47% of the survey respondents in Freedom Charter compared to 11% in Msawawa indicated that they have household members who are planning to relocate to other areas (see Figure 6.4 below on migration). Twenty-seven percent of the respondents in Freedom Charter compared to seven per cent in Msawawa indicated that at least three members of the household are planning to leave to stay elsewhere. This is attributed to factors such as difficult living conditions related to lack of space, no schools and clinics, flooding and fires. Freedom Charter Square has the highest number of households with anticipated out-migration (47%) while Msawawa is relatively lower (11%).





In-migration plays a role in the composition and ability of households to respond to extreme weather events. The findings show that compared to Freedom Charter, in Msawawa fewer members anticipate leaving the settlement and this explains in-migration coupled with limited out-migration as a major contributor to the exponential growth of the local population, making it very dense. An assessment of in-migration proved that Freedom Charter has approximately 20% households that are affected and Msawawa has twelve per cent. Between in-migration and out-migration, the findings indicate that more households have members who want to leave the two settlements than those who want to come in, proving that the household members wishing to out-migrate permanently to other less vulnerable areas is an adaptation measure. The intention to migrate is attributed to the harsh socio-economic conditions in the two settlements worsened by exposure to extreme weather events. The wish to out-migrate is attributed to exposure to flooding and lack of change related to access to services and infrastructure. This also indicates a situation where some household members feel vulnerable and are unhappy about the living conditions in the two settlements. This is supported by the fact that 90% of the households surveyed in Freedom Charter as compared to 99% in Msawawa do not foresee any good future in the two settlements.

## 6.5. Understanding of climate change by households in Freedom Charter and Msawawa

Climate change poses a variety of challenges to communities in the informal settlements that are related to health, limited access to information and awareness. During the in-depth interview with Councillor Mafokwane from Msawawa (Councillor Mafokwane, interview, 25 May 2013), supported this and also expressed the view that it is difficult for the City to discourage communities in informal settlements to reduce the cutting of trees in the vicinity for use as fuel (for cooking or in response to extreme cold) because they do not have alternative resources. The same also applies in winter when people resort to burning almost anything including paraffin, car tyres, papers and plastics for heating purposes, thereby creating heavy pollution that contributes to emissions of greenhouse gases and negative impacts on health (Mr. Ahmed, interview, 23 July 2013; Councillor Mafokwane, interview, 25 May 2013 and Mr. Phalanndwa, interview, 24 May 2013). Shai during the in-depth interview (Mr. Shai, interview, 23 May 2013) stated that:

The pollution is very high in Kliptown [in winter]. The whole of Kliptown will be filled with smoke. You won't even see where you are going normally during the night; it is dark. People lose lives through that *mbaula*<sup>19</sup>. There are those who will say because it is cold I will sleep with it [mbaula] and the gas kills them.

There are various challenges related to household responses such as burning of plastics and other fuels. These are indirect outcomes of household responses to extreme cold. On the burning of plastic, Councillor Mafokwane (interview, 25 May 2013) expressed the view that, he 'was disappointed because I got a call because kids were suffocating from the burning of plastic in the shack in Msawawa'. Mafokwane (Councillor Mafokwane, interview, 25 May 2013) further noted that regarding household responses such as the use of polluting fuels, the

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<sup>19</sup> Mbaula is a self-made stove that is made of a tin and it uses coal. It is mainly used for warming up in winter and sometimes for cooking.

City of Johannesburg does not seem to have solutions on how to reduce the levels of pollution in the two informal settlements, especially in winter. On pollution and environmental awareness in the City of Johannesburg, Gwata (interview, 28 May 2013) during the in-depth interview highlighted that:

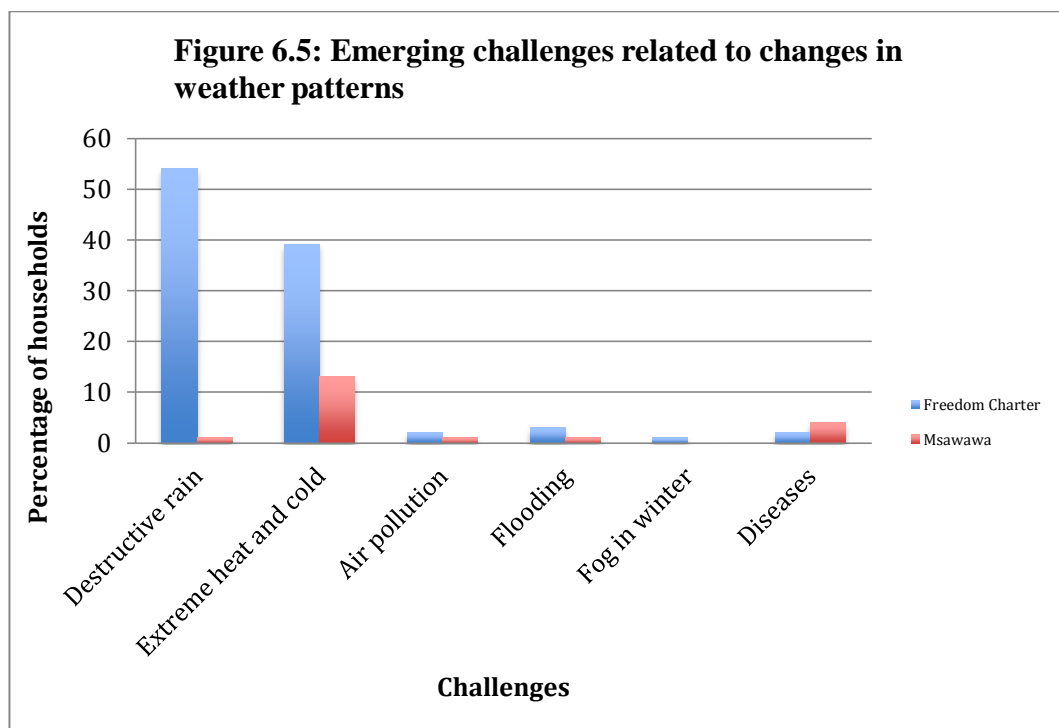
There is a unit that deals with environmental awareness but the guy said that he does not have a budget. He cannot produce pamphlets. He is despondent. These awareness campaigns also tend to be very general and do not focus on informal settlements. It is unclear on how we can evaluate their impact. We do not have targeted sessions in the City where we can have a sense of satisfaction that those people understand.

The literature review in Chapter 3 pointed out that knowledge of climate change and adaptation options is one of the key determinants for households to be able to build adaptive capacity (Chishakwe et al., 2012; Smit & Wandel, 2006). On the changing weather, Phalanndwa, a local community leader in Msawawa (Mr. Phalanndwa, interview, 24 May 2013) during the in-depth interview expressed the view that:

.... because we [households in Msawawa] just adapt ourselves to every kind of situation that is coming because we do not have a solution. Even if it is just overheating, there is no solution here. The thing is maybe it is too cold, there is nothing that...we have to cope with the situation, and we only maybe have to buy jerseys, go around the veldt and look for more wood. When it is raining heavily there is no solution.

The survey findings showed that 36% of households in Freedom Charter compared to 20% in Msawawa indicated that they were aware of changes in weather patterns from year to year (see Figure 6.5). At least more than half of the respondents in the two settlements expressed that they have heard about climate change, but the challenge is that actually less than half of them really understand what it is all about. From survey responses it was clear that of those who have heard about climate change, 31% do not have any understanding of what it is. Councillor Mafokwane (interview, 25 May 2013) suggested that there should be

basic climate change literature that can be shared with the community as a way of addressing the challenge of awareness on climate change in the community. A similar view on the importance of climate change knowledge was expressed by Adger et al. (2009), as discussed in the literature review, namely that knowledge of climate impacts and implications is key for households to be able to develop coping and adaptive capacities.



## 6.6. Conclusion

Households in Freedom Charter and Msawawa were dealing with an array of weather-related challenges that can be related to climate change such as strong winds, hailstorms, heavy downpours, floods and drought. Similarly, they were also dealing with challenges related to fire (prevalent in winter due to open flames used for heating), extreme heat and cold. They were responding to these challenges in various ways that involve repairing or rebuilding the shacks, mainly using similar materials such as second-hand corrugated iron sheets. The main insight emanating from the findings is that households in Msawawa and Freedom

Charter use most efforts in responding to strong winds, followed by heavy downpours, extreme cold, extreme heat, hailstorms, fire, floods and lastly drought. Furthermore, the most significant planned responses were related to strong winds, followed by extreme cold, heavy downpours, fire, extreme heat, hailstorms, drought and flooding. These findings on actual and planned responses further reveal that strong winds are of primary concern to households in the two settlements, followed by heavy downpours, extreme cold and extreme heat. Furthermore, the rate of actual household responses is higher than that of planned responses. An insignificant amount of these actual and planned responses involved adaptation and this reveals that households would mainly remain vulnerable to these extreme weather events.

Household responses to extreme weather events in the two settlements could be mainly classified as coping mechanisms. Very few of the reported responses lead to a reduction in underlying vulnerabilities, and these were weakly represented in the sample. Commonly, the coping responses related to the repair of dwellings, evacuation of the dwelling, mopping up water (related to hailstorms, floods and heavy downpours) and protecting belongings. This had to do with the location of certain dwellings in exposed locations. However, prevailing socio-economic conditions such as limited access to income and economic opportunities as discussed in Chapter 5 evidently constrain the manner in which households respond to the challenges listed above. Notably, the temporal nature of informal settlements does not create any motivation for households to invest in adaptation.

Social capital played a key role in household responses to extreme weather events. As there is a linkage to governance, I deal with collective responses to extreme weather events and those that extend beyond the household in Chapter 7. This is the reason why I discuss social capital and institutional support from government, NGOs, CBOs and religious organisations in that chapter.

**7. CHAPTER SEVEN: THE ROLE OF GOVERNANCE  
ON HOUSEHOLD EXPOSURE AND RESPONSES  
TO CLIMATE CHANGE IN FREEDOM CHARTER  
AND MSAWAWA**

## 7.1. Introduction

Potentially changes to governance could be a key factor in the lives of households in informal settlements. Effective governance is participatory, empowering to local communities and it involves the engagement of all stakeholders in decision-making (*i.e.*, government, NGOs and CBOs). As outlined in Chapter 3, characteristics of adaptive capacity related to governance are flexibility, transparency and informed decision making. Governance could help in reducing vulnerability while simultaneously improving the adaptive capacity of individuals, households and communities through policies, institutional support and service delivery. This chapter provides the research findings on the state of the governance context in the two informal settlements. As outlined in the conceptual framework in Chapter 4, governance or the inadequacy of governance is considered to be fundamental to household exposure, vulnerability and responses to climate change in Msawawa and Freedom Charter. The survey findings on governance also focus on the nature of relationships between households and community in the two settlements and the City of Johannesburg. Furthermore, the chapter also looks at social capital and its role on household responses to climate change.

Furthermore, the findings look at assistance received by households from various entities to respond to extreme weather events. The chapter sheds light on how the households engage with the City of Johannesburg and other stakeholders through two local government programmes that most directly have the potential in helping households not only cope but also to adapt to extreme weather events, *viz.*, IDP and LED strategic processes. These programmes provide platforms where different stakeholders and local institutions engage, identify local priorities and ways to implement them. Potentially these government-community platforms could be used to discuss challenges related to extreme weather events and how to address them. In particular, the LED could enable households to engage in income generating activities that could help them find ways of reducing their vulnerability to extreme weather events.

This chapter provides findings that address the following objective and related sub-questions.

Objective:

- ✓ To identify and evaluate the role of governance in the adaptive capacity of households within informal settlements.

Sub-questions within this objective include:

- In what ways is the governance context contributing to household exposure and responses to climate change in Msawawa and Freedom Charter?
- How participatory and effective is the City of Johannesburg's IDP and LED programmes to household responses to climate change in Msawawa and Freedom Charter?

## **7.2. Protest and leadership in Msawawa and Freedom Charter**

The survey findings revealed that 71% of the households in Freedom Charter and 76% in Msawawa expressed the opinion that the local communities had occasional conflicts with the City of Johannesburg. In Freedom Charter, these conflicts were attributed to a lack of access to services such as low-cost houses and schools. Other challenges were socio-economic factors such as unemployment, drugs and corruption. In Msawawa the conflicts were related to housing, basic services and empty promises. The literature review revealed that conflicts (illuminated through protests), social dysfunction and non-cooperation are some of the factors that are an outcome of adaptation deficits (Williamson et al., 2010). The survey findings showed that 68% compared to 75% of the households in Freedom Charter and Msawawa respectively further indicated that the conflicts between the residents and the City of Johannesburg were never resolved. This situation further strengthens the notion that there is a rift/disconnect between residents of Msawawa, Freedom Charter Square and the City of Johannesburg. On another note, there is the confirmation by the Ward



Councillor for Freedom Charter who said that the tensions are always there, and that there was a moment where the community came to her house to voice their grievances although they were aware that she operates from municipal offices (Councillor Sibanyoni, interview, 22 July 2013). This shows a definite sense of household/community desperation related to service delivery.

When there is a gap in access to services such as electricity, households may find means to provide for themselves through illegal connections as a form of defiance as was the case in Freedom Charter. Duiker (Mr. Duiker, interview, 23 May 2013) noted the following related to this use of illegal electricity in Freedom Charter:

We are not stealing, we are taking, you see, we are engaging the government, we are making a better life possible for ourselves and I have no qualms about it... I have said this on television .... Soweto Television ...

The illegal electricity connections in Freedom Charter noted above have strained the relationships between the households and the City of Johannesburg leading to sporadic clashes. The clashes that took place in May 2013 between the local residents and the City of Johannesburg over the use of illegal electricity (see Figure 7.1) in Freedom Charter Square provides signs of the tensions over access to resources (Councillor Sibanyoni, interview, 22 July 2013). The attempts by the City of Johannesburg to halt illegal connections led to the protests which further points to the tension that has led to some form of conflict which negatively affects participatory approaches such as the IDP discussed later. The protest over the disconnection of illegal electricity in Freedom Charter is an indication of resistance by households whereby their view is that if the City cannot provide, then it must allow them to do what is within their means to do (self-supply sometimes through illegal connections). As noted by Nel et al. (2009) and discussed in the literature review, these protests are also a sign of failure of the City to provide opportunities and services for households.



Figure 7.1: Illegal electricity connection in Freedom Charter (Source, Mpho Nenweli, March 2013)

Households in Msawawa and Freedom Charter had developed a feeling that the City of Johannesburg does not take note of service delivery protests. About this, Duiker (Mr. Duiker, interview, 23 May 2013) indicates that protests ‘have become like water off the duck’s feathers. They [government] just do not care anymore: you can protest, by tomorrow there will be a news item and this would be forgotten.’ In this context, Duiker (Mr. Duiker, interview, 23 May 2013) is pointing to the sentiment that the City of Johannesburg has chosen to ignore the protests because they have become a commonplace. If so, this limits productive participatory approaches that could assist in addressing challenges encountered by households. The turning to protests in the two settlements confirms the statement by Selmeczi (2011), noting that the poor have to resort to fighting in order to get quality urban life, although in this case this has not yet brought any visible gains for the two settlements. On protests again, Shai (Mr. Shai, interview, 23 May 2013) further said that: ‘the government cannot provide services. They have been talking and talking but they do not implement. If they can stop talking and

surprise people by doing things for them'. Furthermore on protests in Freedom Charter Square, Shai (Mr. Shai, interview, 23 May 2013) also indicated that:

Concerning that [protest], what I can say [is that] there was a protest recently, which was not the first one. I believe that was the third or the fourth one. On this recent one, what happened people got shot and others got arrested. There was this chaos whereby even the shops closed early fearing that they would lose their stuff, which was true. The community also caught the Councillor. There are those who were arrested. The Councillor was being taken to the police station to help in the release those who were arrested. Luckily, the police rescued her before they reached the police station.

The findings here show a broad picture of high tension between households and the City of Johannesburg demonstrated by protests and illegal access to services. This situation further shows that governance is weak and that it has limited potential to enable households to respond to extreme weather events.

## **7.2. Social capital and its role in households' responses to climate change**

Social capital is a key part of life for households in informal settlements because it is understood to play a role in strengthening them. However, social capital in extremely challenged situations such as Freedom Charter and Msawawa where there is extreme poverty is weaker because social capital is based on reciprocity.

### **7.2.1. Social support schemes**

There are various social support schemes that are operating in Msawawa and Freedom Charter enabling households to deal with challenges such as burial. On household membership to burial schemes membership, approximately 52% of the households surveyed indicated that they have membership. All the households with burial schemes indicated that the support received is mainly in the form of contributions to burial expenses or funeral costs. The households are aware that

activities such as the death of a family member can demand significant resources from the family. Having burial schemes by family members is considered an important element in improving their coping capacity and exposure to loss of family members. Therefore, the social schemes such as those for burial can be considered key elements of life in informal settlements and coping.

Stokvels play an important role on household ability to save funds in Msawawa and Freedom Charter. As highlighted by Posey (2009) in the literature review, access to financial resources could help in shaping household adaptive capacity. Approximately 15% of the households surveyed stated that they belong to stokvels<sup>20</sup> while 12% belong to groceries-sharing groups where they receive groceries once per annum. More than 60% of the survey respondents stated that they belong to a religious organisation and most of the support is spiritual and emotional after encountering setbacks such as fires, and floods due to climate change. Other forms of support from the church were the provision of food, clothes, blankets, funds, burial, supporting children and behavioural change, and this has played an important role in enabling households to cope with extreme weather events especially after encountering natural setbacks such as heavy downpours and hailstorms. Approximately six percent of the households had members that belonged to music groups that were essential for improving social life, skills in emotional support, income and keeping members busy and away from drugs and crime. Seven per cent of the households stated that they had members that belonged to youth clubs. Survey respondents indicated that support received from youth clubs were educational support, skills, entertainment, school fees, school uniforms, clothing and keeping away from crime. Only five per cent of the households had members that belonged support structures such as a sports club, and the form of support received were clothes, socialisation and physical training. These support structures could play a significant role on making households cope with extreme weather events.

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<sup>20</sup> These are loan associations or ‘informal banking arrangements designed to rotate a lump sum on the basis of monthly contributions’. (Vincent, 2007b, p. 172)

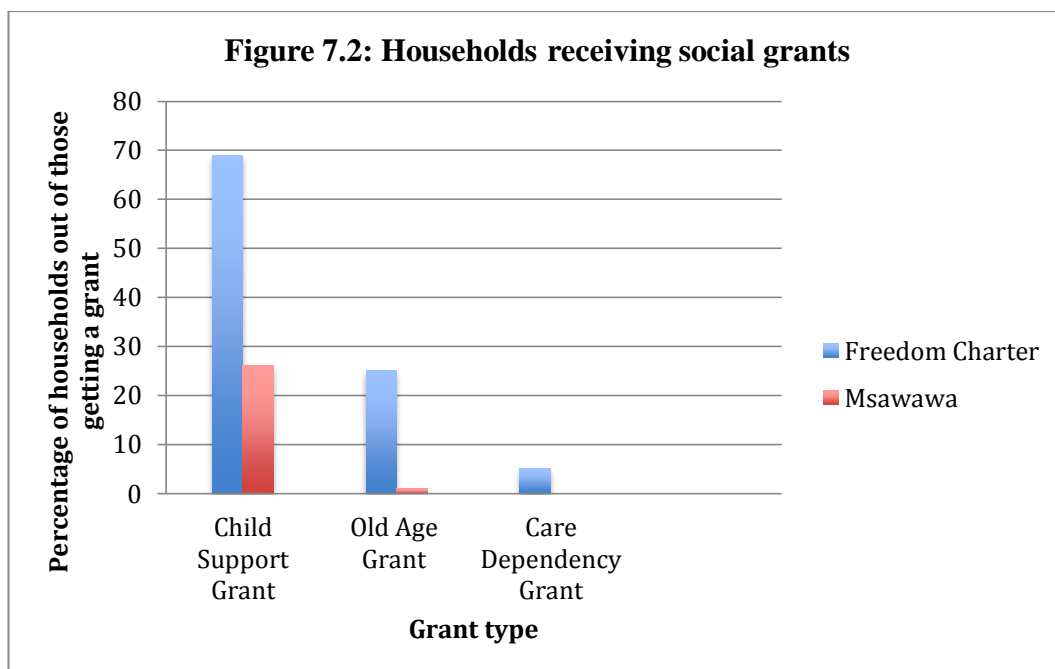
Social capital plays a critical role in households' ability to respond to the negative impacts of extreme weather events (Pelling & High, 2005). The above discussion portrays an array of social capital that households rely on for various needs. These findings concur with Vincent (2007a) and Bell (2012) in the literature review who noted that social networks are one of the determinants that shape adaptive capacity, especially at a household level. Religious institutions are likely to be the main connecting factor for the households followed by burial schemes, stokvels and grocery groups respectively. The other households mentioned social groups together with the church as constituting valuable social capital, which help in enabling households to cope with various challenges that such as flooding and fires. The support received from these clubs are monetary, emotional and material.

The literature review pointed out that households in the two informal settlements are vulnerable due to limited economic activities of household members, but social networks have proved to be important for households in building their ability to adapt to climate change (Williamson et al., 2010). Therefore, a breakdown in the social support could have negative impacts on the quality of lives of households. This implies that for stakeholders with the intention to improve the quality of life in the Msawawa and Freedom Charter Square, the focus should also be on strengthening the existing social support groups that serve various purposes, both directly and indirectly. These social schemes are also vulnerable to disasters related to fires, floods and climate change. As pointed out in the literature review by Adger (2003), strengthening the social networks can help in creating collective benefits and the ability to adapt to climate change as noted. Literature review also highlighted that failures of social systems are considered to be adaptive capacity deficits and limit the potential of people to improve the living conditions and reduce underlying vulnerabilities (Williamson et al., 2010).

### **7.2.2. Household access to social grants**

Social support from the government is a major contributor of income in the households in Msawawa and Freedom Charter Square, and it is providing long-term opportunities to address causes of household vulnerability by distributing resources to those vulnerable as a way of addressing inequality (Williamson et al., 2010). The literature review in Chapter 2 highlighted the study looking at poverty and other socio-economic issues targeting 21% presidential nodes of development in urban and rural areas in South Africa, Everatt et al. (2008) noted that social grants have led to the reduction of poverty in the ISRDP (Integrated Sustainable Rural Development Programme - ISRDP) and URP (Urban Renewal Programme - URP) nodes which included areas like Alexandra in Johannesburg.

The survey findings revealed that 56% of the households in Freedom Charter compared to 40% in Msawawa derived income from grants. This was dominated by the Child Support Grant (CSG) and followed by the Old Age Grant (see Figure 7.2). Since receipt of both types of grants is means-tested this implies that a significant proportion of households in the two settlements are poor and heavily dependent on social support as a source of livelihood. The majority of grants are on CSG and this might be showing a higher level of children in the two informal settlements. The Old Age Grant follows the CSG, but it is less than half of the recipients of the CSG, although this may be showing some ageing in the two settlements it is not very high yet. Assessing income from grants, the CSG pays far smaller (two hundred and ninety rands at the time of the research) amounts than the Old Age Grant (one thousand two hundred and sixty rands at the time of the research) and this is creating a burden for old people to look after the younger household members with their grants. The reliance of households on state social support further confirms the poverty and economic inequalities when looking at the two informal settlements in comparison with formal areas like Sandton in the City of Johannesburg, and this was highlighted by (Murray, 2011). The social grants provide limited resources that are, however, helping households to cope with challenges such as extreme winds as explained above.



Access to social grants has provided some opportunity for households to develop means to cope with extreme weather events by using the funds they get to do things such as improving their dwellings. There is still a significant number of people not accessing the grants in Msawawa and Freedom Charter (52%). This could be people with the legal documentations required to access the grants or they do not qualify. In overall, some of the households that have no members with social support [grants] should be to an extent viewed as worse off and having very low potential to reduce their vulnerability to extreme weather events, especially if they have no other forms of income (Lewis & Mioch, 2005). This means that social grants are one of the determinants of coping in the two informal settlements. However, this is limited by the fact that the amounts provided as social grants are low and they cannot enable households to deal with major challenges related to climate change such as destruction of dwellings in times floods as an example. The provision of social grants has proved to be providing some limited resources to households, although it has limited potential to make any significant improvement in reducing household vulnerability and responses to climate change.

### **7.2.3. Household access to remittances**

Remittances play an important role in households' quality of life in Freedom Charter and Msawawa. The survey findings showed that 17% and five per cent of the households in Freedom Charter and Msawawa respectively receive remittances. Out of these, eight per cent in Freedom Charter compared to three per cent in Msawawa receive remittances monthly, while two per cent in the two settlements receive the remittances occasionally. Therefore, for those who receive remittances annually the number of remittances received is limited and generally sporadic. The findings prove that remittances are also a contributor to the livelihoods of a limited number of households in Msawawa and Freedom Charter and this is derived from an array of bonding social capital that includes relatives and friends. As confirmed by Adger et al. (2003, p. 398) in the literature review, these 'networks of reciprocity' that can help in coping with climate change. Remittances derived from social capital are used for things such as debt repayment and consumption (Vincent, 2007b). Eleven compared to three per cent of the households in Freedom Charter and Msawawa respectively stated they receive remittances that are less than five hundred rands. Four per cent of them in Freedom Charter compared to two percent in Msawawa pointed out that they receive less than between R500 – R1000.

The receipt of remittances from relatives and friends found in distant places underscores the fact that households in informal settlements draw on social networks that are both far and near to improve their quality of life. This further strengthens the fact that social networks are a key driver of survival and coping capacity in informal settlements. As noted by Svendsen and Svendsen (2004), social capital has proved to be a key to access of resources, and in the case of households in Msawawa and Freedom Charter this also includes funds. Therefore, households with no social capital with which to derive remittances from networks are likely to be more vulnerable to climate change. Consequently, those with remittances have the potential to improve their financial capital and coping ability while reducing their vulnerability (Vincent, 2007b).



#### **7.2.4. Available assistance to households in responding to extreme weather events**

Households in Msawawa and Freedom Charter rely on people to access various forms of support that help them to cope with extreme weather events such as strong winds as an example. Approximately 31% of the households in Freedom Charter compared to 15% in Msawawa indicated that they contact family members outside their settlements (but in Johannesburg) for assistance in dealing with daily challenges that may include food, transport and funds for various purposes. Seventeen percent of those households in Freedom Charter compared to five percent in Msawawa said that they get assistance for food. A total of four percent and six percent of the surveyed households in Freedom Charter and Msawawa respectively reported to be relying on friends for assistance. The survey respondents indicated that limited assistance received from local friends by way of funds, emotional support, security and visits to government offices, and this helped in coping with extreme weather events. Less than one percent of the households (only in Freedom Charter) stated that they get assistance from government officials, which is in the form of money (this is just an insignificant situation where officials use their own funds to help out of compassion). A smaller percentage of households received assistance in terms of food from religious institutions, which was less than one percent, and care of community and children by other members of the community, which was also less than one percent in both of the two settlements. Therefore, the findings show that the majority of the households receive support mainly from family members within Johannesburg, followed by those that get assistance from friends. This shows the contribution of social capital in the coping strategies of households in both Msawawa and Freedom Charter Square with extreme weather events. This is also another form of behaviour that is not based on collective decision-making processes, showing the self-organising nature of households in informal settlements in response to the challenges that they face.

Households in Freedom Charter also mentioned that they contact family members outside of Johannesburg for assistance in times of need. This assistance is mainly in the form of money, food, looking after children and clothing (see Table 7.1). Similarly, in Msawawa assistance was in the form of money and looking after children. A significant number of households in both Msawawa and Freedom Charter Square rely on family members and friends both inside and outside of the City of Johannesburg. This points to a situation where households are using both internal (in the city) and external actors (relatives and friends outside of the city) to assist them in coping with their challenges. Findings show that most of the support is derived from family members within the City of Johannesburg, but not in the same settlement.

Table 7.1: Assistance that households receive from people outside of Johannesburg

<b>Form of assistance</b>	<b>Freedom Charter</b>	<b>Msawawa</b>
Financial assistance	10%	11%
Food	3%	0%
Looking after children	1%	2%
Clothing	1%	0%

Interestingly, the findings do show that approximately 14% of the households in the two settlements draw on an array of support from relatives and friends. These networks revealed here show a link between the households in the two informal settlements with others elsewhere in the City of Johannesburg and outside of Gauteng Province. This further shows counter flows (urban households instead of rural ones receiving remittances) of resources such as money and food that is enabled by this social network. The findings also show that social capital helps in enabling households to have the limited means such as funds that could assist in improving household wellbeing and responding to climate change. Further the findings reveal that the weak governance context in the two settlements has forced some of the households to rely on limited social capital in the form of friends and

relatives to enable them to cope with extreme weather events. This social capital is also not significant enough to enable households to access resources that could facilitate improvement of households' adaptive capacity in the two settlements.

#### **7.2.5. Community responses to extreme weather events and related disasters**

The City of Johannesburg's disaster management approach takes climate change issues into account (Anonymous, interview, 28 May 2013). An official in the City of Johannesburg further provided a response that showed the common attitude towards households in informal settlements, which marks the government context. This view is that the disasters are attributed to conditions of vulnerability found in informal settlements and the issue of the so-called 'perverse incentives' where people intentionally settle in areas that are prone to disasters in order to get attention and preference from the City (*ibid.*). These are people who know that once they are affected by disasters the government will try to address their challenges.

Communities in urban areas have been noted to be able to help each other in times of need through reciprocal networks (Hawkins & Mauer, 2012). Social capital has been noted to be a situation where households can count on family and neighbours to help them in times of need, including disasters related to extreme weather (Svendsen & Svendsen, 2004). In terms of actions on addressing disasters, the findings show that 77% of the households in Freedom Charter Square compared to 55% in Msawawa believe that there are collective actions taking place in the community to address any disasters. Survey respondents indicated that collective actions that households in Freedom Charter identified were helping each other with the provision of shelter to people who are negatively affected. Other community actions (also coping) include alerting the councillors of any disasters, rescuing young children, stopping illegal electricity connections, and helping with food parcels and blankets. Similarly in Msawawa, collective coping responses were the provision of building material, rebuilding of dwellings/shacks, helping

those affected to carry their belongings to places of safety, extinguishing fires, digging storm drains near flooded shacks and holding community meetings to find collective solutions. Communities also try stopping illegal electricity connections (illegal electricity is only found in Freedom Charter Square ), cleaning the limited drains that area available in the settlement and providing building material to those affected. In overall, the findings have proved that social capital plays a certain role in improving household well-being as outlined in the literature review by Adger (2003).

#### **7.2.6. Institutional support to households in responding to extreme weather events**

The findings revealed varying household institutional support to extreme weather events in the two settlements. The most significant household support was related to floods (10%) only in Freedom Charter, followed by fire (5%) only in Msawawa and drought (5%) only in Freedom Charter. Overall, the interesting findings related to institutional support show that Msawawa received no support from government, NGOs, CBOs and religious organisations in relation to floods, hailstorms and heavy downpours.

##### ***7.2.6.1. Institutional support related to extreme temperatures***

Few households in the two settlements that were affected by strong winds received support to aid them in responding to strong wind, extreme cold, and heat, and such support was limited in its extent. Only eight and two percent of the surveyed households in Freedom Charter and Msawawa respectively indicated that they received some form of assistance to respond to strong winds. The support in Freedom Charter was from government (4%), NGOs (2%), CBOs (1%) and religious institutions (1%), while in Msawawa it was only from CBOs (2%). This limited institutional support confirms the point stated by the IPCC (2014b) that in urban areas local institutions play a role in enabling coping and adaptation, although here it has mainly enabled coping. The coping support received by

households in the two settlements was assistance in carrying and transporting belongings, food parcels and blankets. The limited amount of support from local institutions and networks portrayed above also shows that when it comes to strong winds, there is a limited amount of households that are forced to turn to each other because there is limited outside assistance. Further, none of the actual and planned responses to damaged household goods can be categorised as adaptation. Comparatively, Freedom Charter seems to receive slightly higher assistance (a combined 8%) than Msawawa, in terms of responding to strong winds damage from government, NGOs and CBOs, while households in Msawawa only get assistance from CBOs (2%). This brings a different understanding of how households affected by the same extreme weather event get assisted differently by the same institutions within the same City. The lesser amount of assistance received by households from these institutions shows to an extent why Msawawa is more vulnerable to strong winds.

In terms of assistance to overcome extreme cold, nine percent of those affected by extreme cold in Freedom Charter indicated that they received limited help from individuals and religious organisations (4%), NGOs (2%), CBOs (2%) and the government (1%). Households in Msawawa only received limited and insignificant assistance to respond to extreme cold from religious organisations (3%).

#### ***7.2.6.2. Institutional support related to fire***

A small proportion of households in Freedom Charter and Msawawa have received varying forms of assistance from different institutions for responding to the impact of fire. In terms of assistance to households during times of fire disasters, households in Freedom Charter indicated that they received support to respond to fire from the NGOs (2%), CBOs (2%), religious organisations (2%) and government (1%) (see Table 7.2). In Msawawa assistance was only received from government (5%). The coping assistance received by households in Freedom Charter and Msawawa were temporary accommodation (9%), food parcels (1%)

and fire extinguishers (1%). This illustrates that the communities of Freedom Charter and Msawawa respectively have to rely, to a large extent, on their own means and non-governmental organisations to respond to fire disasters. This affects their resource base and the ability to build some capacity to adapt to any changes including those related to fire and climate change. The sense of insecurity being experienced by the communities in the two areas arising from fires, limits their ability to invest resources in reducing their vulnerability and building their adaptive capacity. In terms of fire assistance, Msawawa households received very limited assistance only from government. Comparatively, Freedom Charter households (7%) get assistance to respond to fire from NGOs, CBOs, religious organisations and government.

Table 7.2: Assistance received from local institutions by households during times of fire

<b>Institutions that assisted</b>	<b>Freedom Charter</b>	<b>Msawawa</b>
NGOs	2%	0%
CBOs	2%	0%
Religious Organisations	2%	0%
Government	1%	5%

### ***7.2.6.3. Institutional support related to extreme weather events emanating from precipitation***

Household in Msawawa and Freedom Charter received limited support for heavy downpours, hailstorms, floods and drought from the government, NGOs, CBOs and religious organisations. Limited assistance to households during heavy downpours in Freedom Charter has been received from CBOs (5%), the government (4%), NGOs (3%), and religious organisations (3%). Households in Msawawa only received assistance to respond to heavy downpours from CBOs (2%). Only those affected by downpours in Freedom Charter in the past ten years indicated that they received support such as food parcels, temporary shelter and blankets. The assistance received could only help them cope with heavy

downpours. The findings illustrate that there is a significant difference between Msawawa and Freedom Charter Square in terms of the amount of assistance that households receive to deal with heavy downpours. This further shows that in Msawawa households mainly rely on their own efforts to deal with heavy downpours. As was the case in the above extreme weather events, households in Msawawa received the least support to aid their responses to heavy downpours and hailstorms (discussed below).

Assistance received by households in Msawawa and Freedom Charter on dealing with hailstorms was limited. Households in Freedom Charter indicated that the government (4%), NGOs (1%) and religious organisations (1%) assisted them with food and clothing, while those in Msawawa received no assistance from any institutions whatsoever.

Assistance to households related to flooding is also limited. Ten percent of the households affected by floods in Freedom Charter indicated that they received help related to flooding from government, NGOs, CBOs and religious organisations while in Msawawa no assistance of any kind was received by the households. In terms of adaptation to flooding in Freedom Charter, the City of Johannesburg intends to support households and the community by building a storm water attenuation pond in the settlement to try and control the flow of water from the houses to the Klip River (Councillor Sibanyoni, interview, 22 July 2013). This would be done to contain rainwater and reduce the potential for flooding in the settlement. This would be complemented by the construction of a drainage system (*ibid.*). On flooding, households in Msawawa indicated that they received no assistance that could enable adaptation, compared to those who got assistance from government, NGOs, CBOs and religious organisations noted above.

Table 7.3 Assistance received by households in relation to flooding

<b>Organisation providing assistance</b>	<b>Freedom Charter</b>	<b>Msawawa</b>
Government	10%	0%
NGOs	7%	0%
CBOs	4%	0%
Religious Organisations	3%	0%

Assistance to households in responding to drought in Msawawa was received from the government (5%), NGOs (2%) and religious organisations (2%) compared to 2% support from religious institutions in Freedom Charter. The findings showed that there is no significant difference in households affected by drought between Msawawa and Freedom Charter. They are all mainly engaging in coping strategies, and the study could not identify any resources that could potentially aid households in adapting to floods.

The findings above have provided proof that Msawawa receives the least institutional support. Households in Freedom Charter received the most diverse institutional support for flooding (24%), heavy downpours (14%), extreme cold (9%), drought (9%) and strong winds (8%). Comparatively, households in Msawawa got more institutional support for fire (5%) from government, heat (2%) from government, strong winds (2%) from and drought (2%) from CBOs. The findings further revealed that broadly, households received higher support from government for flooding (10%) as compared to NGOs (7%) on flooding.

### **7.3. The contribution of stakeholder relations in the City of Johannesburg to household exposure and responses to extreme weather events**

As outlined in Chapter 2 and the conceptual framework in Chapter 4, governance is considered a key aspect that can help vulnerable households cope with climate change, and move beyond coping towards actual adaptation to climate change. Participatory processes such as the IDP (the IDP integrates social, environmental



and economic issues) in the City of Johannesburg, have the potential to enable households to know more about climate change and hopefully devise strategies to respond to it. Therefore, a healthy relationship between the households/community and the municipality is key in enabling coping and adaptation to climate change. The empirical findings revealed that the relationship between government and communities in the two settlements is limited, and it is bedevilled by the hostile attitudes towards informal settlement residents and inadequate processes that are in place. All of this have contributed to the existence of informal settlements and the scenario is probably quite common in cities with informal settlements. Activities such as protests in the two settlements portray the inadequacies of the city-community/household relationship.

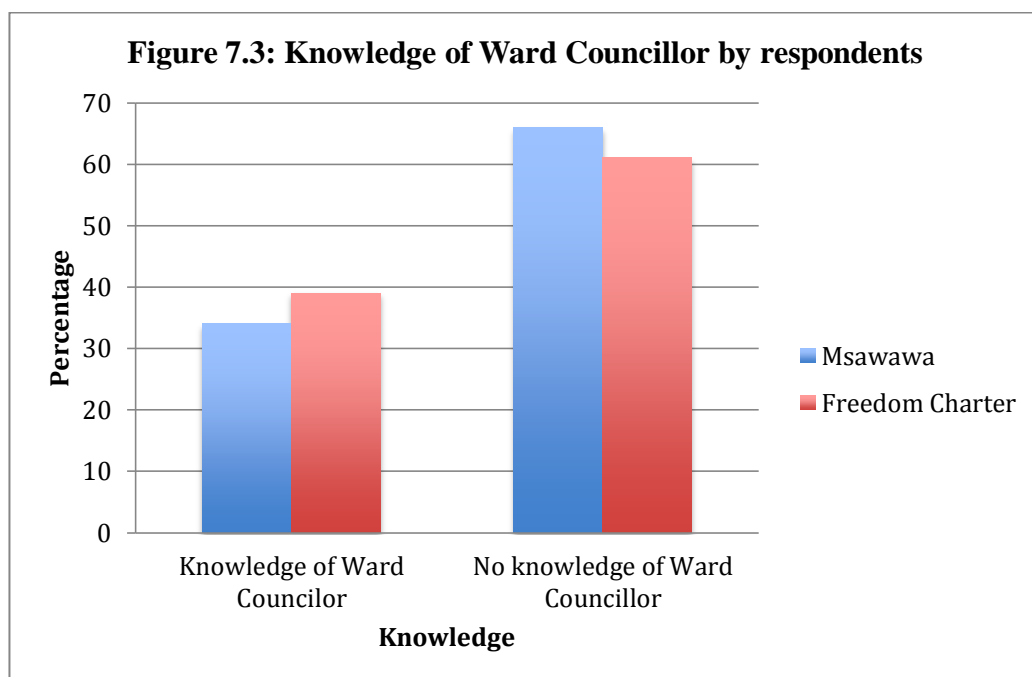
### **7.3.1. Relationships and participatory engagements between households and the City of Johannesburg**

The Ward Councillor plays an important role in ensuring that households in the ward participate in the city planning and policy processes. Therefore, the Ward Councillor is the key link of households with the City of Johannesburg in the two settlements. The survey findings in the two settlements show that few household members know the local Ward Councillor. As noted, the Councillor acts as a representative of the community in the City of Johannesburg (see Figure 7.3). Limited knowledge<sup>21</sup> of who the local Ward Councillor is an indication of the fact that there is a disconnect between the local communities and the municipality. This may be a cause for the limited services and change in the lives of households in the two settlements over the past ten years. The challenge with this situation is the fact that the local Ward Councillor is the *de facto* main link between local households and the City of Johannesburg (although legislation is more nuanced). Sibanyoni (Freedom Charter Councillor) during the in-depth interview (Councillor Sibanyoni, interview, 22 July 2013), provided the view that the Ward

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<sup>21</sup> Knowledge here is referring to knowing the name of the Councillor and the role that he/she plays in the local community. It is also about his role in relation to the local community and the City of Johannesburg.

Councillor facilitates household engagements (participatory processes) to gather inputs that are used for planning (*i.e.*, in the IDP process) and service delivery. Therefore, if the connection between the Ward Councillor and households is weak it may affect how their priorities are integrated into plans and consequently how they get access to services rendered by the City of Johannesburg. This disconnect points out that this aspect of governance is weak and the situation in the informal settlements is almost reaching a tipping point as illustrated by occasional protests discussed later. The weak link also highlights that households rely on self-organisation with limited political leadership. The findings here corroborate the view of the IPCC (2014b) discussed in Chapter 2, that weak and corrupt leadership has the potential to derail adaptation initiatives that households intend to undertake.



Households in Freedom Charter and Msawawa indicated that they are facing relationship challenges with the City of Johannesburg. Eighty-four percent of the surveyed households (Freedom Charter) and 88% in Msawawa of the survey respondents stated that the households are facing challenges with the City of Johannesburg. This further provides evidence of a disconnected and difficult relationship between the City of Johannesburg and residents in Msawawa and

Freedom Charter Square. The household versus City of Johannesburg relationship is in a state where it could not be helpful in enabling households to cope and adapt to climate change. The GCRO (2012) study on quality of life as discussed in the literature review pointed out that approximately 50% of the respondents were unhappy with local government delivery of services in Gauteng in general. The figure on dissatisfaction related to access to services was relatively higher in the two settlements, namely 70% for Freedom Charter and 77% for Msawawa. The challenges indicated by the households in Freedom Charter included lack of services and infrastructure such as schools, limited basic facilities, low-cost housing, burst water pipes, corruption, unfulfilled promises, limited public participation, lack of communication, unemployment, lack of electricity, increased crime and lack of service delivery. Similar challenges were also identified in Msawawa.

The challenges to deliver services may be attributed to organisational challenges in the City of Johannesburg as indicated by an official of the City during an in-depth interview (Anonymous, interview, 28 May 2013) when he expressed the view that:

The political change in the City has tended to impact on the structure of the organisation. [In] our department, the Executive Director contract was not renewed, the Director of Climate Change and Air Quality resigned, Programme Manager Mitigation resigned and Deputy Director Air Quality has resigned. To a large extent the year has not been great. Before the Director left we had all these plans. We thought we could develop a heat wave response plan and do some preliminary assessment of cost-benefit analysis of climate change adaptation in the City looking at all sectors.

On the issue of relationships between households in Freedom Charter and the City of Johannesburg, Shai (Mr. Shai, interview, 23 May 2013) also said that:

I cannot say the relationship is good under the environment in which people live. They say we have a parliament at the Walter Sisulu Square and every time we go there, there is no one. The other challenges we

have, there are parks in Kliptown where kids can play. When a water pipe bursts it takes about three weeks for it to be fixed. We will be calling them everyday and they will say we will be there in five minutes, five minutes it means three to four weeks. The government cannot provide services. They have been talking and talking but they do not implement. If they can stop talking and surprise people by doing things for them.

Phalanndwa and Duiker also concurred with Mr. Shai's sentiments during the in-depth interviews that I conducted with them. In particular, on the Msawawa community versus the City of Johannesburg relationship Phalanndwa (Mr Phalanndwa, interview, 24 May 2013) says:

The relationship is not good. The community is tired of the government because they are not providing them with services. They are tired of the promises. The people want only to be told that next year or this year they are going to move to this place. Tomorrow we are going to erect this or that. They do not want to hear things like we are planning this and we are here to report to you. That is why it has broken down communication with the city.

Duiker (Mr. Duiker, interview, 23 May 2013) also expressed similar challenges of empty promises in Freedom Charter, perhaps exaggerating somewhat, but summarising his decade-long experience as follows:

The City of Johannesburg does not even, via its officials or the political parties do not communicate with the people. You know the old story, they would come when it is election time. Then they ....I do not like this word ... engage with the people. They engage with the people about the challenges they face. They do not talk to the people or discuss with the people and say look, what are the problems that you are faced with...I mean, [as] if they are totally blind.... I mean it is not like they cannot see it but even if they come and ask the people and confirm that even if they are living in these poor conditions...old housing...those promises are

being kept...and they keep repeating ...by 2008, by 2010, then we hear 2014, then we hear about Johannesburg's plan for 2016, now it is 2020...now it is 2050 before we know it, we will be long dead and nothing would have happened.

Access to facilities in the two settlements is a major challenge. On Msawawa's access to facilities, Phalanndwa (local community leader in Msawawa) (Mr Phalanndwa, interview, 24 May 2013) says:

There are no facilities; our children [for schooling] use a free bus from here to Witkoppen. Almost ten kilometres from here. There are no facilities, not even a library. Our clinic [See Figure 7.4] is here but it only operates on Tuesday only. People are just coming and running their crèches, but they are not qualified.



Figure 7.4: Clinic in Msawawa (Source: Mpho Nenweli, March 2013)

Eighty-two percent of the households in Freedom Charter compared to 77% in Msawawa indicated that local community leaders are not providing any assistance in addressing local challenges. This indicates that most of the households (80%)

do not believe in the prevailing local leadership, as compared to 21%. In this situation, the households are forced to take and make efforts to address their challenges. Households in Freedom Charter (18%) indicated that they received some limited assistance from local leaders related to crime, *viz.*, local conflicts, community policing and communication. They also get assistance related to infrastructure and dwellings such as repair of damaged houses and repair of water pipes. In Msawawa (23%), assistance from local leaders was only related to crime: community policing, conflict resolution and dealing with criminals.

The reason for this is explained by Duiker (Mr. Duiker, interview, 23 May 2013) who said that as a local community leader he was frustrated and decided not to play any leadership role because he used to convey promises from the City of Johannesburg to households, which never materialised. He reached a situation where the household members started to view him as a liar, making his life difficult (*ibid.*). This may provide some explanation on why households in informal settlements in some situations prefer to self-organise.

Households' view of their future could enable them to play a positive role in investing in their dwellings and this could improve their coping and adaptation to extreme weather events such as strong wind. Ninety percent of the surveyed households in Freedom Charter compared to 98% in Msawawa indicated that they do not see any future in their settlement. This further confirms the level of apathy and limited confidence. Only four percent of the respondents in Freedom Charter compared to two percent in Msawawa indicated that they see a better future for themselves in the area. Those who could not see a better future in Freedom Charter indicated the challenges that included the flow of dirty water in the streets, confiscation of stock by the municipality from local farmers, sanitation, safety of children, crime, drugs and unemployment. Other challenges highlighted by households in Msawawa include the need for infrastructure such as a library, swimming pool and houses. Households were also concerned about access to services such as water and about corruption. In particular, foreign nationals were concerned about their children not being allowed in local schools. The limited

belief in the future of the place has the potential to impact on the manner in which local residents can build their capacity to adapt to change and this makes them vulnerable to disasters including those related to climate change. In this situation, they are mainly forced to rely on coping mechanisms.

There is inefficient communication between households in Msawawa and Freedom Charter and the City on upcoming development. This shows that existing participatory processes are not effective. This is portrayed by discontent expressed by the households above towards the City, which is difficult to understand considering that the Ward Councillors for the two areas indicate that there are major developments that the City has planned for the two areas. In the case of Msawawa, the planned development to assist local communities involves relocation of the households to Lion Park by 2022 latest (Councillor Mafokwane, interview, 25 May 2013). According to Sibanyoni (Councillor Sibanyoni, interview, 22 July 2013), Freedom Charter is earmarked for development (moving some of the households to other places and *in situ* upgrading) starting from September 2013 until 2016. During the household survey, respondents did not seem to be aware of the proposed developments to improve their lives. Sibanyoni (Councillor Sibanyoni, interview, 22 July 2013) explained this situation during the in-depth interview by stating that: ‘They are aware [residents of Freedom Charter], it is just that when you tell them that development has started they do not see infrastructure as development, *i.e.*, pipes and roads. But they want to see houses. People will tell you that they do not see development because they do not have one [low-cost house] even if their neighbours have’. This situation attests to the fact that local communities have come to see low-cost housing as the main solution to most of their problems, which may be limiting in what they can do to improve their adaptive capacity. This situation was summed up by Kornienko (forthcoming, p. 4) who indicated that the wait for low-cost houses in informal settlements has limited the potential for ‘self-fashioning’ and consolidation of their living spaces. The waiting inevitably limits the ability of households to invest efforts in activities such as building stronger dwellings that could reduce their vulnerability to climate change.

Overall, the findings here show that governance is at a very weak level in the two informal settlements. This is shown by the fact that a significant number (62%) of the households are not even aware of local leaders linking them with the City of Johannesburg. An average of 86% of the surveyed households indicated that they have challenges with the City of Johannesburg related to access to services. This points to a sense of apathy related to limited progress in access to services. Approximately 80% of the surveyed households said that they get no assistance from local leaders on dealing with challenges such as access to services. This challenge of lacking organised local leadership creates a situation where the municipality is unable to have leverage points of engagement. There is also a challenge of participation in local planning and development as some of the households are not aware of the major developments indicated by the Ward Councillors for the two settlements. This disconnect renders governance ineffective and inherently make households loose from any engagements that could help make them less vulnerable to climate change, such as knowledge sharing. This weak governance context in the two settlements also does not provide opportunities for empowering local communities with resources, infrastructure and other means that could help with responding to extreme weather events such as strong winds and floods as discussed in Chapters 5 and 6.

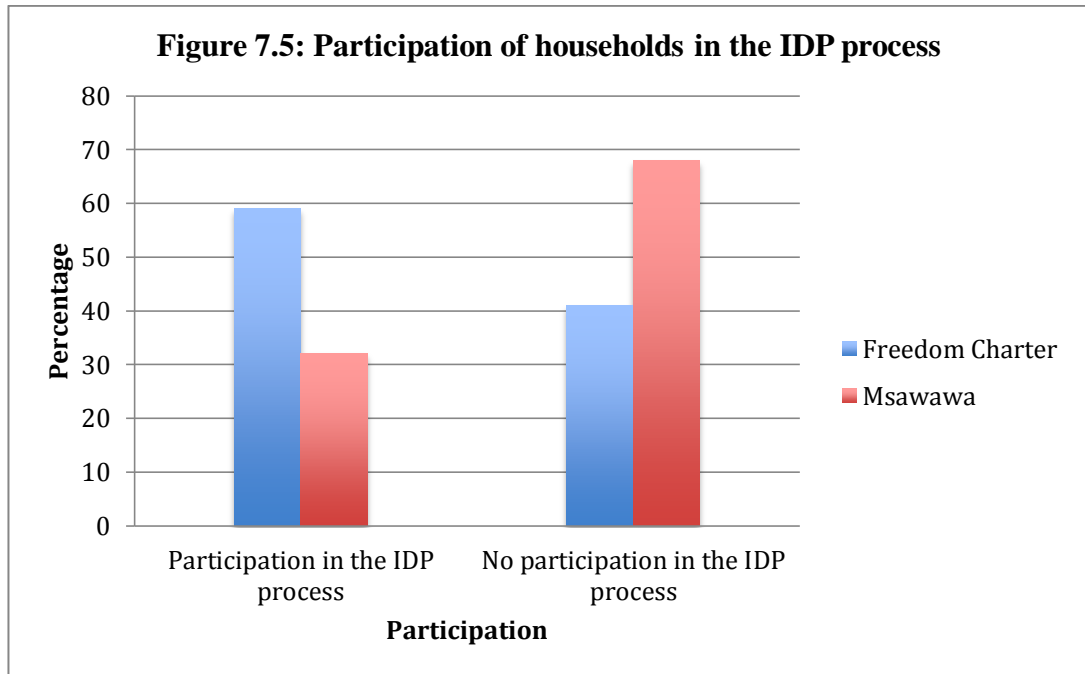
### **7.3.2. Household participation in the IDP process in Freedom Charter and Msawawa**

The IDP process attempts to pull together the needs of the City of Johannesburg into an implementable plan that drives the delivery of services (Mohamed, 2006). As noted in the literature review, the IDP guides all planning, investment, development, management and implementation at a municipal level (*ibid.*). Awareness of the IDP by households was surprisingly high, given the weak governance context represented above. Thirty-nine percent of the survey respondents in Freedom Charter compared to 55% in Msawawa indicated that they are aware of the IDP process (see Figure 7.5 on household participation in



the IDP process). In terms of participation in the IDP process, 59% of households in Freedom Charter compared to 32% in Msawawa participate. Although on average higher as compared to the percentage for the Gauteng Province where the settlements are located, these findings do resemble the sentiments of the GCRO (2012) research outcome on their 2011 quality of life survey, although it was for the whole of Gauteng. This research highlighted that approximately 7% of people in Gauteng indicated that they participate in the IDP process. The relatively high level of participation (but less than half of the households) of residents in Msawawa and Freedom Charter further confirm the disconnect between the households/local community and the City of Johannesburg, but points to a situation where vulnerable households are almost excluded from decision-making, which can negatively affect the manner in which they cope with climate variability (Adger, 2003). This indicates that participatory mechanisms in the City have been limited and to a certain extent relegated to the periphery (Oldfield, 2008). Mogale (2003, p. 223) concurred with the issue by stating that in South Africa participation in planning processes is being applied in a scanty manner with patchy results and that it has degenerated into some 'feel-good slogan'. To support this view, Mohamed (2006) listed the following points as hindering the participation of informal settlements in the IDP process:

- State failure to recognise informal settlements as vulnerable entities that should be mobilised to actively participate in the process of policy formulation;
- Lack of strong movements that can champion the issues of people in informal settlements;
- The complexity of IDP documents and technical information which they contain which are beyond the grasp of most informal settlement residents; and
- Local government IDP engagements undertaken under pressure because officials are mainly under pressure to meet national and provincial implementation targets that can help them secure funding.



There are limitations that stifle participation of households in the IDP process. Mafokwane (Msawawa Ward Councillor) (Councillor Mafokwane, interview, 25 May 2013) further explains the issue of participation by stating that in places such as Msawawa the huge presence of foreign nationals and the different languages is one the limitations of engagement between the City and the local communities in the IDP process. Furthermore, on IDP participation Mafokwane (Councillor Mafokwane, interview, 25 May 2013) says:

I am disappointed, I just had a six month run (engagements with the local community) on the IDP which in fact informed the 2013/14 City of Johannesburg budget we are talking about. Informal settlements people are again, first of all see themselves as outsiders that are another big problem. They do not see themselves as part. They are always of this view that let them decide, they [City of Johannesburg] will tell us anyway, we do not have a say. As much as we tell them that as a resident, you have got a bigger say than you think. In fact, to me being an IDP participant and a voter participant is the same. If not, being an IDP participant is in fact more valued than being a voter participant because a Zimbabwean does not have to vote to put provision of services.

The disconnect also indicates the limited faith that people have in government improving their lives. In this context people are to an extent forced to rely on their own means for survival, and access to illegal electricity in Freedom Charter is a case in point. In this situation, households remain trapped and they rely on coping with limited capacity to adapt to climate change. This limited participation in the IDP process shows the limited faith that households have on the IDP and governance is ineffective as a tool that could help households in the two settlements deal with climate change. Furthermore, in this issue of limited participation in the IDP process, Phalanndwa (Mr. Phalanndwa, interview, 24 May 2013) says that:

So maybe if you are telling them about trees, leaves and water, you see sometimes they [local households/community in Msawawa] do not listen to that. If you want to see them attending every kind of meeting, you must tell them about relocation, that is where you will see everyone. That is when you see that these people are participating, but when you tell them about minor things, it is very much....it is not easy.

Gwata (Mr. Gwata, interview, 28 May 2013) also noted on issues of household participation by saying that:

I am not satisfied with the level of engagement that we as the City have with these communities because I have been given a responsibility to produce a flood management plan for the City. One of the bigger part of that should include local level engagement and specific plans for that locality. I will have to go to Alexander, Tshwetla and sit with those guys and they must tell me and we engage and we develop a plan from them. I do not have to develop a plan for them. For me we are not there.

Contrary to the above picture of disconnect, the local Ward Councillor firmly believed that households are participating actively in the IDP process (Councillor Sibanyoni, interview, 22 July 2013). The Councillor indicated that the IDP process in Kliptown where Freedom Charter is located takes place separately for informal and formal areas. This approach limits the chance of the residents to

evolve together in responding to the changing environment collectively when adapting and interacting. The local Ward Councillor highlighted that after ideas have been received from the residents on the IDP process, she has no control over what gets into the list of things (Final IDP document) that will be implemented by the City (Councillor Sibanyoni, interview, 22 July 2013). Therefore, the Councillor cannot do much to ensure that priorities of the ward get integrated in the final IDP document. In terms of what gets prioritised, the Ward Councillor stated that she is 'at the mercy of the system' (*ibid.*). Therefore, there is limited control by Councillors about what gets prioritised and implemented by the City of Johannesburg.

The participation process in Freedom Charter is segregated, based on formal and informal settlements in the ward. During the in-depth interview with the Ward Councillor for Freedom Charter (Councillor Sibanyoni, interview, 22 July 2013), she mentioned that the IDP process in her ward is done focusing on areas that are sub-divided into blocks as already indicated above, *i.e.*, old four roomed houses, bonded houses, informal settlements, flats and low-cost houses. This sub-division is based on the belief that the needs of communities, depending on where they stay, are not the same. This separation of residents in the ward based on the housing typology creates division and this further limits the opportunity for all the people in the ward to engage and get to understand each other's needs and how they could be dealt with. The people are also not being given the platform to share ideas in order to find solutions for each other's problems in light of the limited available government resources. This lack of interaction also creates a rift between communities in the same ward based on where they stay. The piecemeal treatment of areas by the Ward Councillor in Freedom Charter creates a situation where the focus is on parts instead of the whole. Concentration on the parts can be misleading, and also lead to unsystematic solutions to local household challenges that do not enhance household coping and adaptive capacity.

Overall, the above findings show that the IDP process has been relatively participatory, but not effective in enabling households to improve their living

conditions. On average, the two settlements have relatively higher participation in the IDP process when compared to the provincial average of 7% noted above. The average number of households that do not participate in the IDP process can also be considered high (54%) and this to an extent highlights some form of apathy and disconnect as discussed above. Interestingly, the lowest level of participation is in Msawawa. I expected people in Freedom Charter to be the least participating in the IDP process because the settlement is older than Msawawa and I expected the long wait for services to have a far more negative impact. The limited participation in the IDP process in the two settlements further confirms the findings of Mohamed (2006) which I discussed in Chapter 2, namely that informal settlement communities in particular have not participated (or been able to participate) effectively in decision-making at a local level and that this is attributed to a lack of recognition of their settlements and the lack of capacity by households in informal settlements to communicate. Further, Mohamed (2006) attributed this to the general treatment of households in informal settlements as being non-deserving. The conclusion that I am making here is that the IDP process is relatively participatory (46% average) but that it remains ineffective because it has limited potential to reduce household vulnerability and build household capacity to respond to climate change. Therefore, despite the relatively high participation in the IDP process, households surveyed did not point to any significant contribution that this process has made to their lives in the past ten years. Therefore, this participation is considered to have been insignificant in improving quality of life in the two settlements. Further the participation has not helped in reducing household vulnerability or improved household responses to extreme weather events experienced in the two settlements. This context could be attributed to the fact noted by Mohamed (2006) that the IDP process in informal settlements is not implemented effectively.

### **7.2.3. The state of LED in Msawawa and Freedom Charter**

The empirical findings in Chapter 6 highlighted that one of the key drivers in household exposure to extreme weather events is the absence of economic activity

in households, and the possibility for households is severely constrained. LED is the City of Johannesburg approach aimed at addressing this challenge that is severe in informal settlements through programmes that stimulate local economic activities. Thus, LED has the potential to improve people's lives, especially those in informal settlements, through potential income generating opportunities and local economies. However, as discussed in the literature review, the impact of LED was noted by COGTA (2009) as being ineffective in providing income generating opportunities for households in informal settlements. Therefore, households have to rely on informal businesses such as spaza<sup>22</sup> shops to generate income (see Figure 7.6). This view was confirmed by Khensani (Manager: Economic Development Policy in the City of Johannesburg) (Mrs. Manzini, interview, 28 March 2014) during an in-depth interview by stating that:

The City's LED programme does impact on people in peripheral [informal settlements] areas especially those that are involved in some business activity. However, I cannot say that in general people's lives in informal settlements are improved. Because of the nature of economic activities happening in the City, the policy is biased towards economically active people [the findings in Chapter 5 showed that they are fewer]. Different spheres of government are providing the support but somehow they find themselves struggling to make effective progress. We need to acknowledge that most of the economic activities happening in the informal settlements are also informal in nature.

The quote by Manzini shows that LED has made limited impact in informal settlements. This explains the findings in Chapter 5, indicating that fewer households have members that are economically active. Therefore, LED in its current forms is not able to provide households with the economic means to reduce their vulnerability to extreme weather events. Thus, their ability to respond to these events is also constrained.

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<sup>22</sup> A spaza shop is an informal shop for selling any form of goods or services. These shops are common in informal settlements.



Figure 7.6: Spaza shop in Msawawa (Source: Mpho Nenweli, March 2013)

Survey respondents highlighted that there is limited LED support in their settlements. Thirty-seven percent of the survey respondents in Freedom Charter compared to 31% in Msawawa stated that the City of Johannesburg is supporting the local households with economic activities. It was found that the projects mentioned by the respondents were not primarily focusing on LED. This was corroborated by the Councillor of Freedom Charter who said that there is limited LED support taking place in her ward that she was aware of, except for the consultations with local businesses and facilitation of dialogue between foreign and local spaza owners (*ibid.*). On LED activities in Msawawa, Phalanndwa (Mr Phalanndwa, interview, 24 May 2013) concurs with the above statements by saying that: ‘The City is doing nothing to help the people here. What they are doing, it is like they just come and raid if you are selling beer illegally then they collect everything and take away. But for helping the people here, more especially those ones with small businesses, not at all. Duiker (Mr Duiker, interview, 23 May 2013) also complains that, ‘even the bulk of hawkers up there are not residents of Kliptown. So how does this benefit us. People come here and take

money out, so nothing is spent here'. Shai (Mr. Shai, interview, 23 May 2013) confirmed this during the in-depth interview by stating that:

The other thing, on shops in Kliptown there is no black man owning a shop in the formal business sector. That is bad. Only outsiders, we are talking Chinese and Indians. They do not give back to the community, but the community is everyday there. The relationship is no longer going well. The other sensitive issue is that most of the people owning those businesses are outsiders. They came to Johannesburg for greener pastures. I am talking about those selling vegetables. Some are from Mozambique and Zimbabwe. Through the look of things they are doing well economically.

There are a very limited number of LED projects known to households to be currently taking place in Msawawa and Freedom Charter. As already discussed, an approximately 34% of the households indicated that they are aware of LED programmes that have taken place in their settlement. However, on analysis of the findings it seems respondents were not clear about the LED programmes as they confused this with municipal employment opportunities. Households in Freedom Charter identified these as paving, Kliptown Youth Programme, recycling, housing construction, and repair of communal taps and training. These projects support the view that the households were not clear on what LED is. None of the listed projects could be classified as LED projects aimed at improving the local economy. Households in Msawawa identified benefits derived from the projects as skills acquisition, jobs and cleaning of the environment. Sixty-nine percent of the respondents indicated that the local households are not benefitting from LED projects that are being implemented. Overall, the findings on LED are not conclusive due to the limited understanding of LED by households that I became aware of when analysing the data.

In-depth interviews with Mafokwane provides a contradictory view to that of Phalanndwa noted above in relation to local business support by the City of Johannesburg in Msawawa. Mafokwane (Councillor Mafokwane, interview, 25



May 2013) commented that the City of Johannesburg in Msawawa has been organising discussion forums with local business people to try and create employment opportunities. He further indicated that and he has developed a database of people with skills in Msawawa that is shared with local business to create opportunities for employment. Mafokwane (Councillor Mafokwane, interview, 25 May 2013) presented his own disappointment about the fact that foreign nationals in Msawawa appeared to have the capability to organise businesses while local people were in a dependency mode waiting for things to be done for them. In his view, locals tend to say, 'we fought for liberation, the government owes us, in fact the government promised us'. Mafokwane stressed that this 'is the mind-set that we need to move away from' (*ibid.* The limited skills highlighted by Mafokwane (Councillor Mafokwane, interview, 25 May 2013) are an indicator of the vulnerability of households and also show the challenge on why they are always relying on coping mechanisms without being able to deal with underlying vulnerabilities that expose them to disasters and other challenges.

The ability of households in Msawawa and Freedom Charter is limited by the fact that in some instances they are forced to offer cheap labour that does provide them with the economic resources at household level needed for effective coping and adaptive capacity related to climate change. Councillor Mafokwane (interview, 25 May 2013) seemed aware of this dilemma, stating that residents of Msawawa were exploited by people who give them menial jobs in the surrounding suburbs such as Dainfern, Fourways and Randburg.

Limitation of skills stifles the participation of households in Msawawa and Freedom Charter to participate in the economy. As an example, the Walter Sisulu Square of Dedication in Freedom Charter could be expected to have a major economic spin-off for the local households. The in-depth interviews in Freedom Charter with Shai (local community leader) touched on the Walter Sisulu Square

development with its market space<sup>23</sup>. This is to an extent due to the non-existence of affordable space for locals in Freedom Charter to benefit from the Square.

In-depth interviews revealed the view that in some cases lack of skills limits people in the two informal settlements in participating and benefiting from LED programmes. However, Mafokwane (Councillor Mafokwane, interview, 25 May 2013) believes that foreign nationals found in Msawawa do possess some skills (some are artisans). He goes further to state that ‘they approached me as a Councillor and said we [foreign nationals in Msawawa] have a club comprising of painters, electricians, carpenters and other trades’ (Councillor Mafokwane, interview, 25 May 2013). This self-organising nature of people in informal settlements shows that household members are willing to find solutions to their problems without anybody guiding them. However, these efforts are constrained by the prevailing local economy. LED, despite its good intentions, has not managed to provide opportunities those households in Msawawa and Freedom Charter could use to strengthen their ability to cope and adapt to climate change. The good intentions are pointed out by Manzini (Mrs. Manzini, interview, 28 March 2014) who expressed the view that:

LED is very critical especially in informal settlements. This is where there is room to be innovative, explore new technologies and to get people to be involved. These settlements have labour, poverty and people are eager to be involved to explore because they understand their situations better. They are forced to become innovative in order to survive. Thus, informal settlements are where you can introduce new technologies and replace products easily. This way you create a demand and stimulate growth of new businesses and sectors.

Broadly, the findings have provided evidence that the LED programmes remain ineffective in improving the socio-economic conditions of households in the two informal settlements. Officials from the City of Johannesburg have confirmed that

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<sup>23</sup> Note that the market space was removed in the period after my interview. Areas that used to be used for trading have been landscaped.

LED mainly benefits residents of formal areas and it has also not managed to attract any notable business activities into informal settlements such as Freedom Charter and Msawawa. This then explains the various challenges confirmed by this study in Chapter 5 related to limited access to income and economic activities in Freedom Charter and Msawawa. Therefore, LED has been limited by its failure to effectively engage households in the two settlements in meaningful economic activities and it cannot be considered to have provided an effective basis for reducing household vulnerability and improving responses to climate change.

#### **7.4. Conclusion**

This chapter provided the broad governance context focusing on the two informal settlements. The findings revealed that the level of tension is high and this is an outcome of the strained relations and disconnect between households and the City of Johannesburg. Findings further revealed that an average of 74% of the surveyed households indicated that there are conflicts between households and the City. These are related to household dissatisfaction (74% average) and protests emanating from poor service delivery. Households responded to this lack of services through the utilisation of the available limited social capital to access other forms of support such as funds, food, clothing and emotional support. The social capital is further evidenced by the existence of reliance on collective actions (71%) in addressing challenges related to extreme weather such as flooding in the two settlements. Social capital also played a limited role in household coping. I had expectations of social capital being the main resource and key driver of coping and adaptation in relation to climate change in the two settlements. Overall, the findings revealed that socio-economic challenges encountered by households such as limited income, economic opportunities and low asset base, as discussed mainly in Chapter 5, mean that the ability to invoke social capital is also constrained.

Institutional coping support in response to the extreme weather events was mainly CBOs, NGOs and religious organisations and this was mainly received in Freedom Charter as compared to Msawawa. Coping support from government was received mainly in Freedom Charter in the form of clothing, temporary accommodation and food. Notably, limited government support to households was available on all eight extreme weather events discussed in this chapter. NGOs played a role in household responses to strong winds, extreme cold, hailstorms, floods, fire and drought. Similarly, CBOs were more prominent in cases of strong winds, extreme cold, hailstorms, heavy downpours floods and fire. Religious institutional support received by households was related to extreme winds, drought, extreme cold, heavy downpours and floods.

The IDP has not brought any meaningful change to the lives of households in Freedom Charter and Msawawa. The findings have revealed that a significant number of households in the local communities are participating in the Integrated Development Planning (IDP) process (when compared to the provincial participation rate). The challenge is that households in the two settlements could not identify any tangible benefits of this process, rendering the participation unproductive. Therefore, the IDP is not providing any significant opportunities that households can use to respond to climate change. Furthermore, the IDP as a governance tool, although participatory, it is not sufficiently effective in enabling households to respond to climate change in Freedom Charter and Msawawa.

LED has not been effective in providing economic opportunities that could help reduce vulnerability and enabling household responses to climate change in Freedom Charter and Msawawa. The limited support received from the City of Johannesburg on LED has led to limited local opportunities for income generation such as operating small businesses. Thus, this weak state of LED limits the ability of households to link with the mainstream and formal economy. This exclusion of communities in Freedom Charter and Msawawa has a direct bearing on access to economic opportunities and the quality of life. Therefore, LED has limited potential to enable households to access income that could help with reducing

vulnerability and ensuring that households develop the ability to respond to extreme weather events.

Overall, the findings show that governance is currently ineffective in enabling households to improve the adaptive capacity and this is portrayed by the low level of household participation in planning processes, leadership void and strained relations with the City of Johannesburg. Therefore the potential of governance, as reflected in the interaction of various stakeholders, to strengthen local institutions in the two settlements and improving the capacity of households to cope and adapt to climate change, is limited. Ultimately, the weakness of governance has limited potential to be an effective driver of household adaptation to climate change in Freedom Charter and Msawawa.

## **8. CHAPTER EIGHT: CONCLUSIONS**

## **8.1. Introduction**

This study aimed to understand the drivers of adaptive capacity in relation to climate change through looking at households in two informal settlements in the City of Johannesburg. An extensive review of literature was undertaken, focusing on informal settlements, their characterisation and policy responses (Chapter 2). The literature review also focused on gaining a deeper understanding of the concepts that are used to explain the impacts of climate change, such as vulnerability, coping and adaptation (Chapter 3). The review culminated in a conceptual framework that provided the lens through which findings were analysed. In particular, the empirical study focused on two informal settlements: Msawawa and Freedom Charter, and they were the areas where I spent time in applying a mixed method approach that involved in-depth interviews with key informants and a survey.

This chapter builds on the key findings of the thesis presented and discussed in the results chapters. Chapter 5 provided the socio-economic background, and level of household exposure and sensitivity related to extreme weather events such as strong winds, extreme heat, extreme cold, fire, hailstorms, heavy downpours, floods and drought. Chapter 6 focused on household responses to these extreme weather events and Chapter 7 covered governance in relation to the two settlements and the role it plays on household responses to climate change. This final chapter identifies the drivers of adaptive capacity, as emerging from an analysis of the results; highlights the contribution to academic knowledge, and discusses some implications for future research and practice.

## **8.2. Main findings from the study**

Overall, households in Freedom Charter and Msawawa engage with various socio-economic challenges such as limited economic opportunities and income that contribute to their vulnerability to extreme weather events. Furthermore, these socio-economic circumstances combined with governance challenges constrain

the ability of households to adapt to climate change. The prevailing governance context is limited in enabling households to cope with and adapt to climate change because of the existing tensions related to access to services and the ineffectiveness's of the two key municipal programmes in this regard, namely the IDP and LED programmes that are important to the lives of households in the two settlements.

### **8.2.1. The effects of climate change on households in Msawawa and Freedom Charter**

Chapter 5 provided empirical findings on the socio-economic context and household exposure to climate change in the two settlements. Further, the chapter also focused on household exposure in relation to the households' socio-economic circumstances. This discussion focused on extreme weather events such as strong winds, hailstorms, downpours, floods, drought, extreme heat, extreme cold and fire in Msawawa and Freedom Charter. The chapter aimed at providing responses to the research questions using data obtained during the household survey and key-informant interviews.

This chapter showed that household socio-economic status also plays an important role in household exposure to climate change. Households in Freedom Charter and Msawawa have members who are suffering from an array of health challenges such as TB, HIV&AIDS, high blood pressure, low blood pressure and others. These households also have a limited asset base composed mainly of weak dwelling structures such as shacks (mainly made of second-hand material such as wood, corrugated iron and plastic) and dilapidated houses that are mainly found in Freedom Charter. Further difficulties include the fact that these households also have limited access to economic opportunities and income. There also are a considerable number of households (48%) in the two settlements that rely on access to state social grants to survive. The socio-economic factors described here poignantly show that household vulnerability in the two settlements is linked to the complex prevailing socio-economic circumstances. Therefore, as highlighted

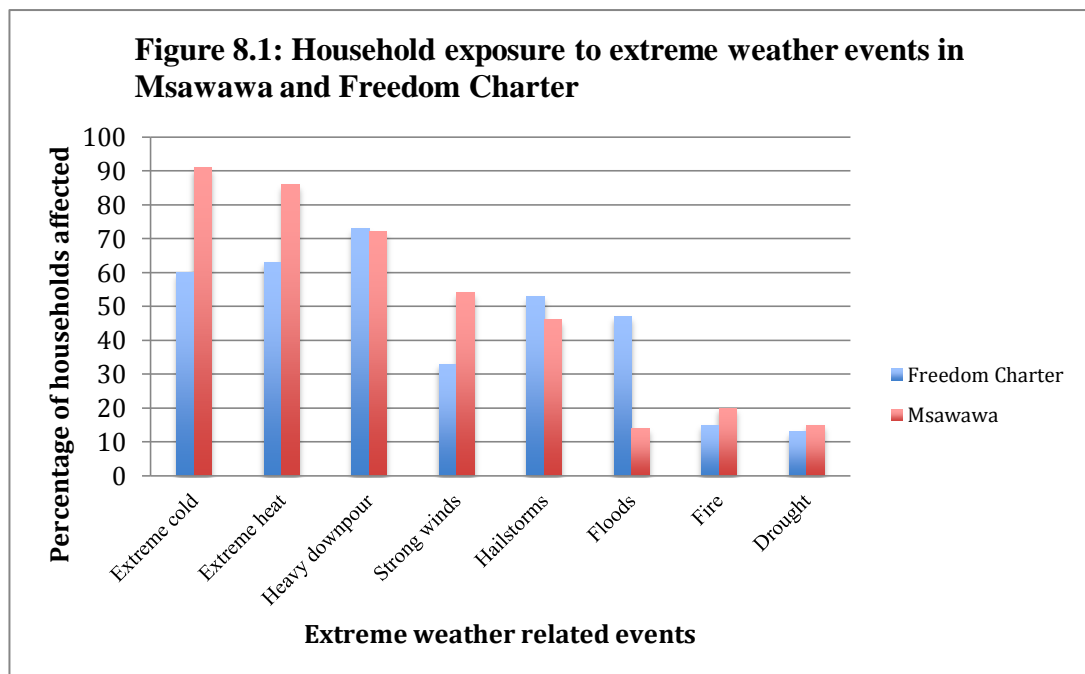


by Bankoff et al. (2004), vulnerability is indeed embedded in social processes and relations, and it exists within a system.

The impacts of the extreme weather events combined with the prevailing socio-economic conditions and the biophysical conditions in the two settlements have negatively impacted on quality of life. The observed negative impacts of the weather events were on assets (*i.e.*, dwellings and belongings), health, and physical wellbeing (*i.e.*, injury). Consequently, these impacts have a negative impact on available resources such as finance and they also strain the existing social capital on which households rely in addressing their vulnerability to extreme weather events.

The findings have provided empirical proof that households in Msawawa and Freedom Charter are exposed to climate change related extreme weather events outlined above. The level of exposure varies between the two informal settlements and within households. As noted by Lewis and Mioch (2005), climate change would have differential impacts upon households in urban areas, and this would be due to 'inequities in resource distribution and opportunity' (Eakin & Luers, 2006a, p. 371). Other factors that have been found to play a role in these differentiated impacts were marital status, economic activity, household head sex, duration of stay in the settlement and access to income. The findings reveal new insights, showing that in the two settlements extreme cold affects households the most, followed by the extreme heat, heavy downpours, strong winds and hailstorms (see Figure 8.1). Figure 8.1 further reveals that Msawawa is more affected by strong winds, extreme cold, fire, extreme heat and drought, while Freedom Charter is more affected by hailstorms, floods and heavy downpours. Therefore, Msawawa is relatively more vulnerable as compared to Freedom Charter due to the fact that it is located on private land (as already discussed, this is viewed negatively by city officials). This is due to the fact that the location of the settlement on private land makes it difficult to receive municipal support, and the fact that the households have to be relocated makes it difficult for them to invest in better dwellings that can withstand extreme weather conditions.

Msawawa also had a considerable number of shacks with plastic roofing and walls as I observed during the fieldwork. Freedom Charter is comparatively more vulnerable to flooding and this is due to the fact that it has a larger portion of households living within the flood line (and thus exposed to flooding) as compared to Msawawa.



Further assessments on strong wind, hailstorms, flooding, extreme heat and extreme cold also show differentiated household exposure in the two settlements. In particular, the findings on strong winds reveal that 86% of households in Freedom Charter as compared to 73% in Msawawa are vulnerable. As explained in Chapter 5, this difference is to an extent attributed to older dwellings that are found in Freedom Charter. In the two settlements households with no economically active members were the most negatively affected by extreme cold (76%), floods (69%), hailstorms (69%), heavy downpours (56%), extreme heat (53%) and strong winds (52%). Thus the findings have provided proof that access to economic activity is key in enabling households to cope and adapt to climate change. Further, households headed by single persons in the two settlements are the most negatively affected by fire, while those with married household heads are mostly affected by extreme cold and heavy downpours. The sex of the household

head was also found to play a role on household exposure to extreme cold where male-headed households are the most exposed in the two settlements. Broadly, these findings further reveal that households without economically active members that are headed by single and male people are relatively more exposed to climate change. The findings also confirm that poverty contributes to household vulnerability to climate change as reflected by households with no economically active members.

### **8.2.2. Household responses to extreme weather events in Freedom Charter and Msawawa**

Chapter 6 of this study looked at household responses to climate change in Msawawa and Freedom Charter. The chapter builds on the findings on household exposure in Chapter 5. Household responses to extreme weather events included efforts such as temporary relocation, rebuilding the shacks with similar material and looking for alternative accommodation. The choice of, and access to, responses are influenced by current socio-economic status such as health, economic activity, social networks and assets.

The study has shown that households in these two settlements are mainly coping with impacts related to extreme weather, as opposed to adapting. Household responses to the various extreme weather events were mainly the continuous repairs of dwellings, temporary relocations, obtaining loans for repairs, using plastic or tent material to improve the condition of the dwellings. The findings further showed that there is no difference between actual responses and how households would have responded to extreme weather events and the main limitations outlined by households were lack of resources such as funds. Households' planned responses to these weather events also exhibit a reliance on coping mechanisms. This shows that households have limited choices on how to respond and this is related to challenges brought about by low income, lack of economic activity and health issues, as discussed above. This sentiment was well articulated by Phalanndwa (the local community leader) (Mr. Phalanndwa,

interview, 24 May 2013) during the in-depth interview who gave the view noting that:

We [households in Msawawa] just try to deal with every kind of situation that is coming because we don't have a solution, even if it is just extreme heat there is no solution here, the thing is maybe even if it is extremely cold, there is nothing that we can do... we have to cope with the situation.

Limits to the responses to climate change observed by households in the two settlements highlights where household adaptive capacity needs to be improved. As pointed out above, this is influenced by limited access to economic opportunities, low asset base, marital status, sex and income. In some instances households are also limited by the prevailing biophysical conditions such as the location of shacks within the flood lines. Responses that households outlined which could help in reducing vulnerability to extreme weather were the planting of trees, building of barrier walls around dwellings, digging trenches (channelling water), elevating foundations of shacks and relocation to places outside the flood lines. Other responses included building better shacks with stronger material such as wood and corrugated iron that would reduce vulnerability. Undertaking these activities would, to an extent, reduce their vulnerability and improve adaptive capacity.

### **8.2.3. The role of governance on household exposure and responses to climate change in Msawawa and Freedom Charter**

Chapter 7 looked at the contribution of governance to household responses to climate change. The findings revealed that the state of governance is weakened by tension between the households and the City of Johannesburg related to land ownership and the status of informal settlement which, in turn, has implications for access to services (particularly in Msawawa) and unfulfilled promises, as portrayed by occasional protests. The challenge regarding governance also relates to the fact that there is a disconnect between households and the municipality both

in Msawawa and Freedom Charter. This is symbolised by the limited knowledge by the households of who the local Ward Councillors are and which could also be contributed to the service access challenges. The lack of services has also led to situations where households in Freedom Charter rely on illegal supplies of electricity. The challenges of services were also highlighted during the in-depth interview with Shai (local community leader) (Mr. Shai, interview, 23 May 2013) who stated the following: ‘the government cannot provide services. They have been talking and talking but they do not implement. If they could stop talking and [and they could] surprise people by doing things for them’. The weak form of governance is a sign of adaptation deficits as pointed out by Williamson et al. (2010). Consequently, the weak governance combined with limited access to services has combined to make households (more than 90% average) hopeless about the future of the two informal settlements. This uncertainty about the future and sense of despair has the potential to limit the efforts that household can make to improve their adaptive capacity. Overall, the prevailing governance context is unlikely to support the building of adaptive capacity by households in Msawawa and Freedom Charter.

The review of literature on social capital in Chapter 3 highlighted that social capital is a resource that households could draw on when addressing climate change (Adger, 2003). The empirical findings have revealed various ways in which households have tried to use access to social capital to address the socio-economic challenges. Interestingly, the findings revealed that a significant number of the households receive limited assistance from friends and relatives beyond Gauteng Province (when compared to within the province) where the two settlements are located. The assistance that is received is in the form of food, clothing, funds and emotional support. The findings showed that social capital, although constrained, could be an important determinant of household responses to climate change. In particular, the restricted benefits of social capital were the assistance that households also provide to each other in response to extreme weather conditions, mainly fire. The support identified was mainly in the form of the repair of dwellings, the provision of temporary accommodation, food and

clothing. The findings also revealed that social support schemes such as stokvels, music groups, grocery sharing groups, youth clubs, burial societies and religious group offer an array of limited assistance that were emotional support, spiritual support and finance. The survey findings have confirmed that social capital offers various forms of restricted household support that have helped households to cope with extreme weather events. The prevailing socio-economic conditions (discussed above) in the two settlements such as health challenges and low economic activity, constrain the effectiveness of social capital in enabling coping and adaptation.

Institutional support from government, NGOs, CBOs and religious institutions plays a variable but important role on how households in Freedom Charter and Msawawa respond to climate change. The findings show that the City of Johannesburg is playing a limited but important role to support households in Msawawa and Freedom Charter. This role was the supply of water, sanitation and waste management services, which households mainly rated as inefficient. Other organisations that have provided limited support to households to cope with extreme weather events were NGOs, CBOs and religious. Most of the support was received in Freedom Charter when compared with Msawawa and it was mainly in the form of food, shelter and clothes. However, the two settlements have no identifiable infrastructure that could help in reducing household vulnerability to climate change. In this context, households have to resort to coping with very limited opportunities to improve their adaptive capacity. Thus, although governance can play a significant role in improving coping and the adaptive capacity of households as articulated by UN-Habitat (2011), the findings show that it is currently ineffective and contested. This is further compounded by the fact that households (an average of 71%) also feel that there is no effective local leadership that can help in enabling households to adapt to climate change.

LED has also not been effective in improving local economic conditions in the two informal settlements, and thus the socio-economic drivers of vulnerability persist. The low level of economically active members discussed in Chapter 5

within households demonstrated this situation. Although households could identify limited LED projects such as paving of streets in Freedom Charter, there were no further tangible benefits that households could identify and the identified projects were not necessarily focusing on LED. The findings also revealed that households have limited understanding of what LED is about – which is testament to the low level of benefits that have accrued to them from it. Local Ward Councillors also conceded that few LED activities have been undertaken to improve the local economies in the two settlements. Thus, this then shows that the City has not done significant work to improve the two informal settlements economically, creating a situation where households have limited access to resources, which impedes their adaptive capacity. This situation was confirmed by Manzini (City of Johannesburg: Manager Economic Policy and Planning) (Mrs. Manzini, interview, 28 March 2014) during the in-depth interview who noted the following challenge related to LED:

One needs to deal with the informal settlement itself [before engaging on LED]. We cannot shy away with the fact that if we have not dealt with the informality factor it is difficult to bring initiatives or invest in the area. You can do trainings, but for business to thrive you need infrastructure. If there is a chance for formalisation of the area, then it is possible for the City departments to engage on sector [LED] initiatives in order to create integrated development.

### **8.3. What constitutes adaptive capacity in Freedom Charter and Msawawa?**

Households in Freedom Charter and Msawawa mainly rely on coping mechanisms. These coping strategies mainly involve repairing the dwellings, migrating temporarily, borrowing funds, putting stones on roofs, getting assistance from friends, relatives and community members. There are adaptation measures that households have undertaken to respond to extreme weather events, such as strong winds and heavy downpours. These adaptation measures include

building brick dwellings and relocating to areas above the flood line. The interesting finding is that in some instances households would adapt to flooding by relocating to areas beyond the floodline but still have dwellings that make them vulnerable to other extreme weather events such as strong winds and heat – thus there is no one-size-fits-all approach to adapting to the multi-faceted challenges of climate change.

The surveyed households noted that there are various factors that impact on adaptive capacity in their settlements. These are lack of knowledge on climate change, and limited access to funds and other resources such as building materials. However, households indicated that social capital provide limited means that enable them to access resources such as funds and building material that is used to erect improved dwellings. Through social capital, households are able to access free labour that the community offers to households affected by extreme weather events such as strong winds which then assist them in building better structures. During the survey, I also witnessed community members in Freedom Charter seeking donations for vulnerable households and rebuilding dwellings. Furthermore, the households indicated that another key adaptation factor is ownership of better dwellings (asset) that can endure extreme winds, especially when made of bricks. Unfortunately, a significant number of the surveyed households do not own dwellings made of bricks and this was attributed to various factors such as lack of funds, income and access to economic activities.

Household adaptation to climate change in the two settlements is driven by various factors. These factors include the nature of area (*i.e.*, biophysical – not in the flood line) where dwellings are located, governance (*i.e.*, provision of social grants) and socio-economic conditions such as access to economic opportunities. These socio-economic conditions tend to vary based on marital status and the sex of the household head. Central to most of the responses identified by households is the issue of personal creativity (as a driver) portrayed by the digging of dongas, placing sand bags and erecting concrete/stone walls around the dwellings which helps in enabling adaptation to extreme weather events such as heavy downpours



and flooding. These were interesting situations that I observed during the survey, particularly in Freedom Charter Square.

Households are also aware of the role that the biophysical environment plays in their vulnerability to various extreme weather events. Households indicated that factors that could constitute adaptive capacity in their settlements related to the biophysical environment include trees, drainage facilities and other infrastructure such as well-drained tarred roads (because the paths that they use get eroded, making dwellings difficult to access when there are heavy downpours). However, due to space and land constraints (and fuel needs) it is difficult to have trees in the two settlements.

#### **8.4. Contribution to knowledge**

This study provides empirical evidence on the complex interrelationship between informal settlements and climate change based on findings from two informal settlements in the City of Johannesburg. As indicated by UN-Habitat (2011), households in informal settlements are more vulnerable to climate change based on the fact that they are sometimes located on unfavourable land, in weak housing structures and with limited assets that inherently negatively affect their adaptive capacity. This study provides additional insights into this statement by highlighting the varying levels of vulnerability and adaptive capacity in Msawawa and Freedom Charter.

Extreme weather events such as strong winds, hailstorms, heavy downpours, floods and drought have different impacts on households in Msawawa and Freedom Charter. Lewis and Mioch (2005) found that climate change will have differential impacts upon urban communities, and these were impacts on livelihood assets that may be social relations, human capital (*e.g.*, skills), financial resources and infrastructure and natural resources. In this study the differentiated household impacts observed were damage to dwellings and belongings, and injury. In Msawawa and Freedom Charter the most important factors that

contributed to differential impacts were economic activity, which in turn is differentiated by the sex of the household head and marital status. For example, households headed by single people were more vulnerable to fire (70% of those affected) and this due to a variety of factors such as having weak dwellings and limited access to income. On extreme cold, households headed by men with no economically active members were the most affected (64% of those affected). Social capital was also identified as another key factor. These factors play a role on how households cope and adapt to climate change.

In addition to the factors found by Lewis and Mioch (2005), this study shows that governance plays a key role in coping and adapting to climate change. As highlighted by UN-Habitat (2003), governance has the potential to determine the levels of development and household preparedness for extreme weather to climate change, and social changes. Thus the governance focus was linked to some of the key planning processes that the City of Johannesburg uses to improve people's lives, such as the IDP and LED. Findings of the study provided insight on the inefficiencies of governance in places that are relatively more vulnerable such as the two informal settlements. This insight was shown by the limited knowledge and participation in the IDP and LED process by households in Msawawa and Freedom Charter, and the lack of implementation of the City of Johannesburg Adaptation Plan. The inefficiencies of governance were attributed to an extent to limited participation. This study also point out that effective governance is vital in helping households improve their ability to cope and adapt to climate change.

### **8.5. Areas for further study**

This study was exploratory in nature, and it has highlighted a number of nuances in existing understanding on the drivers of adaptive capacity in informal settlements. It attempted to bring a focus on urban areas based on the understanding that urbanisation rates are increasing leading to more people settling in informal settlements. Some of the people who have chosen an urban

life find themselves residing in informal settlements such as Msawawa and Freedom Charter that are located in fragile areas exposed to climate change.

Considering the findings of this study, I suggest that future research could:

- Identify the role that informal settlements could play in climate change mitigation in urban areas;
- Look at other informal settlements in the City with different characteristics to assess if their vulnerability and adaptive capacity (or lack thereof) is similar;
- Conduct an in-depth assessment to identify holistic solutions that could be implemented to help households in informal settlements to adapt to climate change;
- Assess the ways in which the local government could strengthen social capital to make it responsive to climate change related challenges; and
- Study the role of gender in household vulnerability, coping and adaptation to climate change in informal settlements.

#### **8.6. Policy implications of understanding drivers of adaptive capacity in informal settlements**

Understanding household vulnerability to climate change in informal settlements is of policy significance because these are the areas mainly occupied by low-income populations of the city who are experiencing the negative impacts of climate change. As populations in cities such as Johannesburg continue to grow, so will the number of people settling on fragile areas exposed to extreme weather events and disasters. Therefore, it is important in the City of Johannesburg, and other cities in southern Africa that have an increasing number of people settling in informal settlements to understand the interrelationship between climate change and informal settlements in order that they can plan appropriately to support adaptive capacity and thus reduce potential negative impacts.

Understanding the drivers of adaptive capacity of households in these settlements is a prerequisite to developing responsive and appropriate policy responses. There is also a great deal of value in understanding the coping mechanisms that households in vulnerable settlements employ to address extreme weather events to find ways of converting them to adaptive capacity that reduces vulnerability. The findings of this study can provide empirical insights that can help in the revision of the City of Johannesburg Climate Change Adaptation Plan by ensuring that informal settlements and their adaptation needs are represented. This will also help city planners identify household adaptation initiatives that need to be strengthened to reduce dependency on state assistance and reactive coping.

The current situation in Msawawa and Freedom Charter show signs of adaptation deficits that are evidenced by continuous damage to dwellings and belongings, and the reliance on coping strategies with limited change in underlying vulnerabilities. To build adaptive capacity, policy responses need to pay attention to improving household access to economic opportunities, income and social capital. However, this is not sufficient, because access to funds does not guarantee improved adaptation to climate change. Developmental efforts by city officials and the community need to be combined with efforts such as listening, understanding, trust, responding and tailoring interventions to the reality of urban informality. The city also needs to strengthen governance to help in creating conditions that can improve household adaptive capacity through access to economic opportunities. This shows that city planners must know that improving the adaptive capacity of households in informal settlements will require further strengthening of governance. The provision of support such as low-cost housing alone may not be effective in improving household adaptive capacity, and policies need to look into the complex array of issues that affect people's quality of life such as the economy, socio-economic conditions and the surrounding environment to identify long-term solutions.

## 8.7. Conclusion

Climate change poses a serious challenge to households that reside in informal settlements in sensitive areas (UN-Habitat, 2011). As already noted, the increase in urbanisation in South Africa over the past decades led to a situation where a significant population is residing in urban areas (UN-Habitat, 2008), with a significant proportion in low-income settlements that are vulnerable to climate change due to biophysical and socio-economic circumstances (Lewis & Mioch, 2005). Understanding the interconnection between climate change and informal settlements is key in identifying the drivers of household adaptive capacity. This could potentially help in building adaptive capacity to identifying ways for reducing the vulnerability of households to extreme weather events such as strong wind, heavy downpours, hailstorms, floods and drought.

This study has shown that household social and economic conditions play a pivotal role in household vulnerability to climate change. The socio-economic factors are also influenced by an array of complex factors such as governance, social capital and external environmental conditions. These findings are in line with the social school of vulnerability which explains that vulnerability is inherently embedded in society and that it is an outcome of the characteristics of households (Brooks, 2003). Therefore, efforts from any actors to help households build adaptive capacity need to be aimed at dealing with the factors underlying the mentioned social and economic characteristics that make them vulnerable. Thus, this would help in addressing household vulnerability to climate change.

## References

- Adeniji, G., & Ogundiji, B. (2009). *Climate adaptation in Nigerian Cities: Regularizing informal and illegal settlements in Ibadan. Paper prepared for the World Bank*. Paper presented at the 'Urban Symposium', Palais du Pharo, Marseille, 28 - 30 June 2009.
- Adger, W. N. (1999). Social vulnerability to climate change and extremes in coastal Vietnam. *World Development*, 27(2), 249-269.
- Adger, W. N. (2003). Social capital, collective action, and adaptation to climate change. *Economic Geography*, 79(4), 387-404.
- Adger, W. N. (2006). Vulnerability. *Global Environmental Change*, 16(3), 268-281.
- Adger, W. N., Dessai, S., Goulden, M., Hulme, M., Lorenzoni, I., Nelson, D. R., . . . Wreford, A. (2009). Are there social limits to adaptation to climate change? *Climatic change*, 93(3-4), 335-354.
- Adger, W. N., Huq, S., Brown, K., Conway, D., & Hulme, M. (2003). Adaptation to climate change in the developing world. *Progress in Development Studies*, 3(3), 179-195.
- Adger, W. N., Paavola, J., & Huq, S. (2006). *Toward justice in adaptation to climate change*. Cambridge: Massachusetts Institute of Technology Press.
- Adhikari, A., Subedi, S., Shrestha, P., Shrestha, P. K., & Mandhar, S. (2008). Community action in Nepal. *Tiempo*, (68). <http://www.tiempocyberclimate.org/portal/archive/pdf/tiempo68low.pdf>. [Accessed on 24 July 2012].

- Afifi, T., Liwenga, E., & Kwezi, L. (2013). Rainfall-induced crop failure, food insecurity and out-migration in Same-Kilimanjaro, Tanzania. *Climate and Development*, 6(1), 53-60.
- Agrawal, A. (2008). The role of local institutions in adaptation to climate change *Paper prepared for the Social Dimensions of Climate Change, Social Development Department*. Washington DC: The World Bank.
- Alinovi, L., Mane, E., & Romano, D. (2009). Measuring household resilience to food insecurity: Application to Palestinian households. *FAO-ESA Working Paper*. FAO, Agricultural and Development Economics Division, Rome.
- Anderson, L. E. (2010). *Social Capital in developing democracies: Nicaragua and Argentina compared*. New York: Cambridge University Press.
- Arendse, A., & Blaauw, R. (2008). Tea farming in south Africa. (68). <http://www.tiempocyberclimate.org/portal/archive/pdf/tiempo68low.pdf>. [Accessed on 24 July 2012].
- Arnall, A., Furtado, J., Ghazoul, J., & De Swardt, C. (2004). Perceptions of informal safety nets: A case study from a South African informal settlement. *Development Southern Africa*, 21(3), 443-460.
- Atkinson, D., & Marais, L. (2006). *Urbanisation and the future urban agenda in South Africa*. Cape Town: Human Sciences Research Council.
- Ayers, J. (2009). International funding to support urban adaptation to climate change. *Environment and Urbanization*, 21(1), 225-240.

- Babbie, E. (2007). *The practice of social research* (11 ed.). United States: Thomson Learning, Inc.
- Babbie, E. (2011). *Introduction to social research* (5 ed.). United States: Wadsworth Cengage Learning.
- Babugura, A. A. (2005). *Vulnerability to climate variability in Botswana 1972 - 2002*. (Doctor of Philosophy), University of the Witwatersrand, Johannesburg.
- Ballard, R., Habib, A., & Valodia, I. (2006). Social movements in South Africa: promoting crisis or creating stability? In V. Padayachee (Ed.), *The development decade? Economic and social change in South Africa, 1994-2004* (pp. 397-412). Cape Town: Human Sciences Research Council
- Bankoff, G., Frerks, G., & Hilhorst, D. (2004). *Mapping vulnerability: Disasters, development, and people*. London: Routledge.
- Barnett, T. (2002). HIV/AIDS impacts studies II: some progress evident. *Progress in development studies*, 2(219-225).
- Barrios, S., Bertinelli, L., & Strobl, E. (2006). Climatic change and rural–urban migration: The case of sub-Saharan Africa. *Journal of Urban Economics*, 60(3), 357-371.
- Barry, M., & Rütther, H. (2005). Data collection techniques for informal settlement upgrades in Cape Town, South Africa. *Urban and Regional Information Systems Association Journal*, 17(1), 43-52.



- Beall, J., Crankshaw, O., & Parnell, S. (2002). *Uniting a divided City: Governance and social exclusion in Johannesburg*. London: Earthscan Publications Ltd.
- Beavon, K. S. (2004). *Johannesburg: The making and shaping of the city*. Pretoria: University of South Africa Press.
- Bell, J. (2012). *The changing climate of livelihoods in Lesotho: The vulnerability of rural livelihoods in Phelantaba village, northern Lesotho, to climate variability and change*. (Masters Degree in Geography), University of Johannesburg, Johannesburg.
- Berger, A., & Ali, M. (2008). Adaptation in south Asia. *Tiempo*, 68. <http://www.tiempocyberclimate.org/portal/archive/pdf/tiempo68low.pdf>. [Accessed on 24 July 2012].
- Berkes, F., & Jolly, D. (2002). Adapting to climate change: social-ecological resilience in a Canadian western Arctic community. *Conservation Ecology*, 5(2), 18.
- Berman, R., Quinn, C., & Paavola, J. (2012). The role of institutions in the transformation of coping capacity to sustainable adaptive capacity. *Environmental Development*, 2(2012), 86-100.
- Berrang-Ford, L., Ford, J. D., & Paterson, J. (2011). Are we adapting to climate change? *Global Environmental Change*, 21(1), 25-33.
- Bhandari, D., & Gurung, G. (2008). Increasing resilience in Nepal. *Tiempo*, 68. <http://www.tiempocyberclimate.org/portal/archive/pdf/tiempo68low.pdf>. [Accessed on 24 July 2012].

- Blaikie, P. M., Cannon, T., Davis, I., & Wisner, B. (1994). *At risk: natural hazards, people's vulnerability, and disasters*. New York: Routledge.
- Blaikie, P. M., Cannon, T., Davis, I., & Wisner, B. (2004). *At risk: natural hazards, people's vulnerability and disasters*. Canada: Routledge.
- Blair, J. P., & Carroll, M. (2009). Social Capital and Local Economic Development. In J. E. Rowe (Ed.), *Theories of Local Economic Development: Linking Theory to Practice*. Auckland: Ashgate Publishing Company
- Blakely, E. J., & Leigh, N. G. (2010). *Planning Local Economic Development: Theory and Practice*. Los Angeles: SAGE Publications, Incorporated.
- Boeije, H. (2010). *Analysis in Qualitative Research*. Los Angeles: SAGE Publications Ltd.
- Boudreaux, K. (2008). *Urbanization in Africa's housing markets*. Oxford: Blackwell Publishing.
- Bradley, C. (1997). Qualitative versus quantitative research methods. In Y. Carter & C. Thomas (Eds.), *Research methods in primary care* (pp. 31-38). Oxon: Radcliffe Medical Press Ltd

- Bremner, L. (2008). Reframing township space. In A. Mbembe & S. Nuttall (Eds.), *Johannesburg: The elusive metropolis*. Johannesburg: Wits University Press
- Brooks. (2003). *Vulnerability, risk and adaptation: A conceptual framework*. Paper presented at the Tyndall Centre for Climate Change Research Working Paper.
- Bryan, E., Deressa, T. T., Gbetibouo, G. A., & Ringler, C. (2009). Adaptation to climate change in Ethiopia and South Africa: options and constraints. *Environmental Science & Policy*, 12(4), 413-426.
- Budlender, D. (2003). The debate about household headship. *Social Dynamics*, 29(2), 48-72.
- Callaway, J. M. (2004). Adaptation benefits and costs: are they important in the global policy picture and how can we estimate them? *Global Environmental Change-Human and Policy Dimensions-Part A*, 14(3), 273-282.
- Cannon, T. (2008). Vulnerability, “innocent” disasters and the imperative of cultural understanding. *Disaster Prevention and Management*, 17(3), 350-357.
- CDE. (2002). *Johannesburg: Africa's World City*. Johannesburg: Centre for Development Enterprise.
- Chalupnicek, P. (2010). The CAPITAL in Social Capital: An Austrian Perspective. *American Journal of Economics and Sociology*, 69(4), 1230-1250.

- Chhotray, V., & Stoker, G. (2010). *Governance theory and practice*. London: Palgrave Macmillan.
- Chishakwe, N., Murray, L., & Chambwera, M. (2012). *Building climate change adaptation on community experiences*. London: International Institute for Environment and Development.
- COGTA. (2009). *State of Local Government in South Africa: overview report*. Pretoria: Department of Cooperative Governance and Traditional Affairs.
- Cohen, L., Manion, L., & Morrison, K. (2000). *Research Methods in Education* (5 ed.). RoutledgeFalmer: New York.
- Cohen, L., Manion, L., Morrison, K., & Morrison, K. R. B. (2007). *Research methods in education*. New York: RoutledgeFalmer.
- Cohen, L., Sykes, Wheaton, & Stevens. (2002). *Evaluation of the effects of climate change on forage and livestock production and assessment of adaptation strategies on the Canadian prairies*. Saskatoon: Prairie Adaptation Research Collaborative.
- CoJ. (2008). *The Five Year Soweto Economic Development Plan 2008 – 2013: Towards building a productive and competitive regional economy*. Johannesburg: City of Johannesburg.

- CoJ. (2010a). Integrated Development Plan 2010/2011. [http://www.joburg.org.za/index.php?option=com\\_content&task=view&id=2854&Itemid=198](http://www.joburg.org.za/index.php?option=com_content&task=view&id=2854&Itemid=198). [Accessed on 7 September 2011].
- CoJ. (2010b). *Excel spreadsheet list of informal settlements*.
- CoJ. (2012). *2012/16 Integrated Development Plan: 2013/14 Review*. Johannesburg: City of Johannesburg.
- CoJ (Cartographer). (2014a). Map of the City of Johannesburg.
- CoJ (Cartographer). (2014b). Map of Freedom Charter Square.
- CoJ (Cartographer). (2014c). Map of Msawawa.
- CoJa. (2009). *LED Funding Database and Baseline LED Project Funding Strategy*. Johannesburg: City of Johannesburg.
- CoJb. (2009). *Climate change adaptation plan*. Johannesburg: City of Johannesburg.
- Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches*. Thousand Oaks: SAGE Publications, Incorporated.
- Cutter, S. L. (2003). The vulnerability of science and the science of vulnerability. *Annals of the Association of American Geographers*, 93(1), 1-12.
- Cutter, S. L., & Finch, C. (2008). Temporal and spatial changes in social vulnerability to natural hazards. *Proceedings of the National Academy of Sciences*, 105(7), 2301.

- Dang, H., Michaelowa, A., & Tuan, D. (2003). Synergy of adaptation and mitigation strategies in the context of sustainable development: the case of Vietnam. *Climate Policy*, 3(Supplement 1), S81-S91.
- Davis, M. (2006). *Planet of slums*. London: Verso.
- Del Mistro, R., & Hensher, D. A. (2009). Upgrading Informal Settlements in South Africa: policy, rhetoric and what residents really value. *Housing Studies*, 24(3), 333-354.
- Devadason, R. (2011). Metaphor, social capital and sociological imaginaries. *The Sociological Review*, 59(3), 633-654.
- Devas, N. (2001). Does city governance matter for the poor? *International Planning Studies*, 6(4), 393-408.
- Devas, N. (2004). Urban poverty and and governance in an era of globalisation, decetralisation and democratisation. In N. Devas (Ed.), *Urban Governance, Voice and Poverty in the Developing World* (pp. 15 - 36). London: Earthscan
- Dodman, D. (2010). Urbanization and urban risk. In D. McClean (Ed.), *World Development Report 2010: Focus on urban risk* (pp. 91-113). Geneva: International Federation of Red Cross and Red Crescent Societies.
- Douglas, I., Alam, K., Maghenda, M., McDonnell, Y., McLean, L., & Campbell, J. (2008). Unjust waters: climate change, flooding and the urban poor in Africa. *Environment and Urbanization*, 20(1), 187-205.

- DPLG. (2006). *National Framework for Local Economic Development: Stimulating and Developing Sustainable Local Economies*. Pretoria: Department of Provincial and Local Government.
- Drew, P., Raymond, G., & Weinberg, D. (2006). *Talk and interaction in social research methods*. London: SAGE Publications Ltd.
- Eakin, H., & Luers, A. L. (2006a). Assessing the vulnerabilities of social-environmental systems. *Annual Review of Environment and Resources*, 31, 365-394.
- Eakin, H., & Luers, A. L. (2006b). Assessing the vulnerability of social-environmental systems. *Annual Review of Environment and Resources*, 31(1), 365.
- Eberle, S. D. (2003). *Social capital and good governance: The impact of civil society on government performance*. (Masters of Arts in Politics and Management), University of Konstanz, Konstanz.
- ECSECC. (2013). *Key results for the Eastern Cape*. East London: Eastern Cape Provincial Government.
- Ellis, F. (2000). *Rural livelihoods and diversity in developing countries*. Oxford: Oxford University Press.
- Engle, N. L. (2011). Adaptive capacity and its assessment. *Global Environmental Change*, 21(2011), 649-656.

- Eriksen, Brown, & Kelly. (2005). The dynamics of vulnerability: locating coping strategies in Kenya and Tanzania. *The Geographical Journal*, 171(4), 287-305.
- Eriksen, & Kelly. (2007). Developing credible vulnerability indicators for climate adaptation policy assessment. *Mitigation and Adaptation Strategies for Global Change*, 12(4), 495-524.
- Everatt, D., Smith, M. J., Jennings, R., & Solanki, G. (2008). *Study on the ISRDP and URP: Building sustainable livelihoods*. Pretoria: National Department of Social Development.
- Fankhauser, S., & Burton, I. (2011). Spending adaptation money wisely. *Climate Policy*, 11(2011), 1037-1049.
- Fekade, W. (2000). Deficits of formal urban land management and informal responses under rapid urban growth, an international perspective. *Habitat International*, 24(2), 127-150.
- Few, R. (2003). Flooding, vulnerability and coping strategies: local responses to a global threat. *Progress in Development Studies*, 3(1), 43-58.
- Fourie, C. (1998). The role of local land administrators: An African perspective. *Land use policy*, 15(1), 55-66.
- Frankish, C. J., Kwan, B., Ratner, P. A., Higgins, J. W., & Larsen, C. (2002). Challenges of citizen participation in regional health authorities. *Social Science and Medicine*, 54(2002), 1471-1480.
- Füssel, H. M. (2005). *Vulnerability in climate change research: A comprehensive conceptual framework*. Paper presented at the Breslauer Symposium,



University of California International and Area Studies, UC Berkeley.  
<http://escholarship.org/uc/item/8993z6nm>

Füssel, H. M. (2007a). Adaptation planning for climate change: concepts, assessment approaches, and key lessons. *Sustainability Science*, 2(2), 265-275.

Füssel, H. M. (2007b). Vulnerability: a generally applicable conceptual framework for climate change research. *Global Environmental Change*, 17(2), 155-167.

Füssel, H. M., & Klein, R. J. T. (2006). Climate change vulnerability assessments: an evolution of conceptual thinking. *Climatic Change*, 75(3), 301-329.

Gallopín, G. C. (2006). Linkages between vulnerability, resilience, and adaptive capacity. *Global Environmental Change*, 16(3), 293-303.

GCRO. (2012). Powerpoint presentation: Quality of Life in the Gauteng City-Region: 2011 findings. Johannesburg: Gauteng City Region Observatory.

Gerring, J. (2007). *Case study research: principles and practices*. Cambridge: Cambridge University Press.

Ghimire, Y. N., Shivakoti, G. P., & Perret, S. R. (2010). Household-level vulnerability to drought in hill agriculture of Nepal: implications for adaptation planning. *International Journal of Sustainable Development & World Ecology*, 17(3), 225-230.

- Goliger, & Retief. (2007). Severe wind phenomena in Southern Africa and the related damage. *Journal of Wind Engineering and Industrial Aerodynamics*, 95(9), 1065-1078.
- Gray, D. E. (2009). *Doing research in the real world* (2 ed.). Los Angeles: Sage.
- Guillaume, P., & Houssay-Holzschuch, M. (2002). Territorial strategies of South African informal dwellers. *Urban Forum*, 13(2), 86-101.
- Habib, A., & Kotze, H. (2003). Civi society, governance and development in the era of globalisation: The South Africa case. In G. Mhone & O. Edigheji (Eds.), *Governance challenges in the new South Africa: The Challenges of globalisation*. Cape Town: University of Cape Town Press.
- Habib, A., & Maharaj, B. (2011). *Giving & Solidarity: Resource Flows for Poverty Alleviation in South Africa*. Cape Town: HSRC Press.
- Habitat, U. (2009). *Planning Sustainable Cities: Global Report on Human Settlements*. Earthscan, London.
- Habtemichael, F. S. (2009). *Anti-corruption strategies in the South African public sector – perspectives on the contributions of complexity theory and ICTs*. Thesis. University of Stellenbosch. Stellenbosch.
- Haferburg, C., & Huchzermeyer, M. (2015). An introduction to the governing of post-apartheid cities. In C. Haferburg & M. Huchzermeyer (Eds.), *Urban governance in post-apartheid cities: Modes of engagement in South Africa's Metropolises* (pp. 3 - 14). Pietermaritzburg: University of Kwazulu-natal Press

- Hawkins, R. L., & Mauer, K. (2012). Unravelling Social Capital: Disentangling a Concept for Social Work. *British Journal of Social Work*, 42(2012), 353-370.
- Hay, J., & Mimura, N. (2006). Supporting climate change vulnerability and adaptation assessments in the Asia-Pacific region: an example of sustainability science. *Sustainability Science*, 1(1), 23-35.
- Henning, E., van Rensburg, W., & Smit, B. (2004). *Finding your way in qualitative research*. Pretoria: van Schaik Publishers.
- Hilhorst, D., & Bankoff, G. (2004). Introduction: mapping vulnerability. *Mapping vulnerability: disasters, development & people*. London: Earthscan, 1-9.
- Hinkel, J. (2011). "Indicators of vulnerability and adaptive capacity": Towards a clarification of the science-policy interface. *Global Environmental Change*, 21(1), 198-208.
- Hope, S., R.K. (2009). Climate change and development in Africa. *International Journal of Environmental Studies*, 66(5), 693-658.
- Huchzermeyer, M. (2003). A legacy of control? The capital subsidy for housing, and informal settlement intervention in South Africa. *International Journal of Urban and Regional Research*, 27(3), 591-612.
- Huchzermeyer, M. (2010). Pounding the tip of the iceberg: the dominant politics of informal settlement eradication in South Africa. *Politikon*, 37(1), 129-148.
- Huchzermeyer, M. (2011). *Cities with 'Slums': From Informal Settlement Eradication to a Right to the City in Africa*. Cape Town: University of Cape Town Press.

- Huchzermeyer, M. (2013). *Humanism, creativity and rights: invoking Henri Lefebvre's right to the city in the tension presented by informal settlements in South Africa today*. Inaugural Lecture, School of Architecture and Planning, University of the Witwatersrand 12 November, 2013. Inaugural Lecture. University of the Witwatersrand. Johannesburg.
- Huchzermeyer, M., Karam, A., & Maina, M. (2014). Informal settlements. In P. Harrison, A. Todes, G. Gotz & C. Way (Eds.), *Changing space, changing city: Johannesburg after apartheid*. Johannesburg: Wits University Press
- Huchzermeyer, M., Karam, A., Stemela, L., Siliga, N., & Frazenburg, S. (Eds.). (2006). *Policy, data and civil society: Reflections on South African challenges through an international review*. Cape Town: University of Cape Town Press.
- Huq, S., Kovats, R. S., Reid, H., & Satterthwaite, D. (2007). Editorial: Reducing risks to cities disasters and climate change. *Environment and Urbanization*, 19, 3-15.
- ILO. (2006). *A Local Economic Development Manual for China*. Geneva: International Labour Organisation.
- IPCC. (2007a). *Climate change: The physical science basis*. Geneva: Intergovernmental Panel on Climate Change.
- IPCC. (2007b). *Climate change mitigation*. Geneva: Intergovernmental Panel on Climate Change.

- IPCC. (2007c). *Impacts, Adaptation and Vulnerabilities*. Geneva: Intergovernmental Panel on Climate Change.
- IPCC. (2008). *Climate Change 2007: Synthesis Report. Contribution of the working groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Geneva: Intergovernmental Panel on Climate Change.
- IPCC. (2013). Summary for policymakers Climate change 2013: The Physical Science Basis. Contribution of Working group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge: Cambridge University Press. Retrieved from [http://www.climatechange2013.org/images/report/WG1AR5\\_ALL\\_FINAL.pdf](http://www.climatechange2013.org/images/report/WG1AR5_ALL_FINAL.pdf).
- IPCC. (2014a). Summary for policymakers *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contributing of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (pp. 1-32). Geneva: Cambridge University Press
- IPCC. (2014b). Chapter 8: Urban areas Climate Change 2014: Impacts, Adaptation, and Vulnerability. Geneva: Intergovernmental Panel on Climate Change. Retrieved from [http://ipcc-wg2.gov/AR5/images/uploads/WGIIAR5-Chap8\\_FGDall.pdf](http://ipcc-wg2.gov/AR5/images/uploads/WGIIAR5-Chap8_FGDall.pdf).
- Irvin, R. A., & Stansbury, J. (2004). Citizen participation in decision making: is it worth the effort? *Public administration review*, 64(1), 55-65.

- Isaacs, D. N. (2006). *Evaluating Local Economic Development in the City of Cape Town*. (Masters in Arts (Public and Development Management)), University of Stellenbosch, Stellenbosch.
- Jennings, T. L. (2011). Transcending the Adaptation/Mitigation Climate Change Science Policy Debate: Unmasking Assumptions about Adaptation & Resilience. *Weather, Climate, and Society*, 3, 238-248.
- Judin, H., Roux, N., & Zack, T. (2014). Kliptown: Resilience and despair in the face of a hundred years of planning. In P. Harrison, G. Gotz, A. Todes & C. Wray (Eds.), *Changing scape, changing city: Johannesburg after apartheid* (pp. 319-421). Johannesburg: Wits University Press
- Kelly, P. M., & Adger, N. (2000). Theory and practice in assessing vulnerability to climate change and facilitating adaptation. *Climatic Change*, 47, 325-352.
- Khoza, S. (2007). *Introducing socio-economic rights. Socio-economic rights in South Africa* (2 ed.). South Africa: The Socio-Economic Rights Project.
- Kjaer, A. M. (2004). *Governance*. Cambridge: Polity Press.
- Klein, R. J. T. (2003). Adaptation to climate variability and change: what is optimal and appropriate. In C. Giupponi & M. Shechter (Eds.), *Climate Change in the Mediterranean: Socio-Economic Perspectives of Impacts, Vulnerability and Adaptation* (Vol. 32-50). Cheltenham: Edward Elgar Publishing.

- Klein, R. J. T., Schipper, E. L. F., & Dessai, S. (2005). Integrating mitigation and adaptation into climate and development policy: three research questions. *Environmental Science & Policy*, 8(6), 579-588.
- Kniveton, D., Smith, C., Black, R., & Schmidt-Verkerk, K. (2009). Challenges and approaches to measuring the migration-environment nexus. *Migration, Environment and Climate Change: Assessing the Evidence*, 41-112.
- Kornienko. (2013). *Engaging informal settlements as landscapes of place: Reconceptualising urban communities in the struggle for in-situ upgrading*. (PhD, Town and Regional Planning), University of the Witwatersrand, Johannesburg.
- Kornienko. (forthcoming). Waiting, hope, democracy, and space: how expectations and socio-economic rights shape two South African informal communities. *Journal of Asian and African Studies*, 1-16.
- Kruger, Goliger, Retief, & Sekele. (2010). Strong wind climatic zones in South Africa. *Wind and Structures*, 13(1), 1-17.
- Kruger, Retief, & Goliger. (2013). Strong winds in South Africa Part 2: Mapping of updated statistics. *Journal of the South African Institution of Civil Engineering*, 55(2), 46-54.
- Kruger, & Welman. (2001). *Research methodology for the business and administrative sciences*. South Africa: Oxford University Press.
- Kulabako, R. N., Nalubenga, M., Wozzi, E., & Thunvik, R. (2010). Environmental health practices, constraints and possible interventions in peri-urban settlements in developing countries – a review of Kampala, Uganda. *International Journal of Environmental Health Research*, 20(4), 231–257.

- Kuljian, C. L. (2007). *What Happened to Kliptown?* (Masters in Writing), University of the Witwatersrand, Johannesburg.
- Kuljian, C. L. (2009). The Congress of the People and the Walter Sisulu Square of Dedication: from public deliberation to bureaucratic imposition in Kliptown. *Social Dynamics: A Journal of African Studies*, 35(2), 450-464.
- Kumar, R. (2005). *Research methodology: A step-by step guide for beginners* Thousand Oaks: SAGE Publications Ltd.
- Kuriakose, A. T., Bizikova, L., & Bachofen, C. A. (2009). *Assessing vulnerability and adaptive capacity to climate risks: Methods for investigation at local and national level*. Paper presented at the Social Development Working Papers - Social dimensions of climate change.
- Laczko, F., & Aghazarm, C. (2009). *Migration, environment and climate change: assessing the evidence*. Geneva: International Labour Organisation.
- Lall, S. V., & Deichmann, U. (2012). Density and disasters: economics of urban hazard risk. *The World Bank Research Observer*, 27(1), 74-105.
- Lancee, R. (2012). The economic returns of bonding and bridging social capital for immigrant men in Germany. *Ethnic and Racial Studies*, 35(4), 664-683.
- Leary, N., Adejuwon, J., Barros, V., Batima, P., Butorn, I., Chinvanno, S., . . . Webbe, M. (2008). A stitch in time: General lessons from specific cases. In N. Leary, J. Adejuwon, V. Barros, I. Burton, J. kulkarni & R. Lasco (Eds.), *Climate change and adaptation*. London: Earthscan.



- Lewis, D., & Mioch, J. (2005). Urban Vulnerability and Good Governance. *Journal of contingencies and crisis management*, 13(2), 50-53.
- Madzwamuse, M. (2010). *Climate governance in Africa: adaptation strategies and institutions*. Cape Town: Heinrich Boll Stiftung.
- Magrath, J. (2010). The injustice of climate change: voices from Africa. *Local Environment*, 15(9-10), 891-901.
- Makhulu, A. M. (2010). Relocating the politics after liberation: The “Dialectics of Toil”: Reflections on the Politics of Space after Apartheid. *Anthropological Quarterly*, 83(3), 551-580.
- Manion, L., Morrison, K., & Cohen, L. (2000). *Research Methods in Education* (5 ed.). New York: RoutledgeFalmer.
- Manion, L., Morrison, K., Morrison, K. R. B., & Cohen, L. (2007). *Research Methods in Education*. New York: Routledge Falmer.
- Mann, M. E., & Jones, P. D. (2003). Global surface temperatures over the past two millennia. *Geophysical Research Letters*, 30(15), 1820.
- McGregor. (1994). Climate change and involuntary migration: implications for food security. *Food Policy*, 19(2), 120-132.
- McMichael, C., Barnett, J., & McMichael, J. (2012). An Ill Wind? Climate Change, Migration, and Health. *Environmental Health Perspectives*, 120(5), 646-654.

- McMillan, J. H., & Schumacher, S. (2001). *Research in education: A conceptual introduction* (5 ed.). New York: Longman.
- Merriam, S. B. (2002). *Qualitative research in practice: Examples for discussion and analysis*. New York: Jossey-Bass.
- Misselhorn. (2008). *Draft position paper on informal settlements upgrading: Part of the strategy for the second economy for the office of the South African Presidency*. Pretoria.
- Moench, M. (2010). Responding to climate and other change processes in complex contexts: Challenges facing development of adaptive policy frameworks in the Ganga Basin. *Technological Forecasting and Social Change*, 77(6), 975-986.
- Mogale, T. M. (2003). Developmental local government and decentralised service delivery in the democratic South Africa. In G. Mhone & O. Edigheji (Eds.), *Governance in the new South Africa: The challenges of globalisation* (pp. 215-242). Cape Town: University of Cape Town
- Mohamed. (2006). From ideas to practice: The involvement of informal settlement communities in policy-making at city level in South Africa. *South African Review of Sociology*, 37(1), 35-47.
- Mukheibir, P., & Ziervogel, G. (2007). Developing a Municipal Adaptation Plan (MAP) for climate change: the City of Cape Town. *Environment and Urbanization*, 19(1), 143-158.

- Muller, E., Diab, R., Binedell, M., & Hounsoume, R. (2003). Health risk assessment of kerosene usage in an informal settlement in Durban, South Africa. *Atmospheric Environment*, 37(15), 2015-2022.
- Murray, M. (2008). *Taming the disorderly city: the spatial landscape of Johannesburg after apartheid*. Cape Town: University of Cape Town Press.
- Murray, M. (2009). Fire and Ice: Unnatural Disasters and the Disposable Urban Poor in Post-Apartheid Johannesburg. *International Journal of Urban and Regional Research*, 33(1), 165-192.
- Murray, M. (2011). *City of extremes: The spatial politics of Johannesburg*. Durham: Duke University Press.
- Napier, M., & Rubin, M. (2002). *Managing environmental and disaster risks affecting informal settlements: Lessons in innovative practice from South African local authorities*. Paper presented at the Sustainable livelihoods in the integration of informal settlements in Asia, Latin America and Africa, Surabaya.
- NDEA. (2011). *National Climate Change Response White Paper*. Pretoria: National Department of Environmental Affairs.
- Nel, E. (2001). Local economic development: a review and assessment of its current status in South Africa. *Urban Studies*, 38(7), 1003-1024.
- Nel, E., Binns, T., & Bek, D. (2009). Misplaced expectations? The experience of applied local economic development in post-apartheid South Africa. *Local Economy*, 24(3), 224-237.

- Nel, E., & Rogerson, C. (2005). Setting the scene: local economic development in Southern Africa. *Nel, Etienne y Rogerson, Christian.(2005) The Experience of Southern Africa. Local Economic Development in the Developing World. New Jersey: Transaction Publishers, 1-16.*
- Noble, J. A. (2008). Memorialising the Freedom Charter: contested imaginations for the development of Freedom Square at Kliptown, 1991-2006. *SAJAH*, 23(1), 13-32.
- NUSP. (undated). The NUSP Resource Kit. National Upgrading Support Programme. Retrieved 5 November 2011 <http://www.upgradingsupport.org/learn.html> (no longer available online)
- OECD. (2011). *OECD Territorial Reviews: The Gauteng City Region, South Africa Africa 2011*. South Africa: OECD Publishing.
- Oldfield, S. (2008). Participatory mechanisms and community politics: Building consensus and conflict. In M. Donk, M. Swilling, E. Pieterse & S. Parnell (Eds.), *Consolidating development local government* (pp. 487-500). Cape Town: University of Cape Town Press
- Panda, A., Sharma, U., Ninan, K. N., & Patt, A. (2013). Adaptive capacity contributing to improved agricultural productivity at the household level: Empirical findings highlighting the importance of crop insurance. *Global Environmental Change*, 23(2013), 782-790.
- Parry-Davies, D. (2004). *The Enviropaedia: Environmental Encyclopaedia and networking directory for southern Africa*. Simons Town: Eco-logic Publishing Co.

- Pelling, M. (2003). *The vulnerability of cities: natural disasters and social resilience*. London: Earthscan.
- Pelling, M. (2011). *Adaptation to climate change: from resilience to transformation*. New York: Routledge.
- Pelling, M., & High, C. (2005). Understanding adaptation: What can social capital offer assessments of adaptive capacity? *Global Environmental Change Part A*, 15(4), 308-319.
- Pernegger, L. (2015). *Urban governance in post-apartheid cities: Modes of engagement in South Africa's Metropoles*. C. Haferburg & M. Huchzermeyer (Eds.), (pp. 61- 97).
- Piguet, E., Pécoud, A., & De Guchteneire, P. (2011). Migration and Climate Change: An overview. *Refugee Survey Quarterly*, 30(3), 1-23.
- Pittock, A. B. (2009). *Climate change: the science, impacts and solutions* (2 ed.). London: Earthscan.
- Posey, J. (2009). The determinants of vulnerability and adaptive capacity at the municipal level: Evidence from floodplain management programs in the United States. *Global Environmental Change*, 19(4), 482-493.
- Potts, D. (2009). The slowing of sub-Saharan Africa's urbanization: evidence and implications for urban livelihoods. *Environment and Urbanization*, 21(1), 253-259.
- Putnam, R. D. (1993). *Making democracy work. Civic traditions in modern Italy*. Princeton: Princeton University Press.

- Reid, H., Huq, S., & Murray, L. (2010). *Community Champions: Adapting to Climate Challenges. IIED. London, IIED.*
- Richards, R., O’Leary, B., & Mutsonziwa, K. (2007). Measuring quality of life in informal settlements in South Africa. *Social Indicators Research, 81(2)*, 375-388.
- Roberts. (1989). Urbanization, migration, and development. *Sociological Forum, 4(4)*, 665-691.
- Roberts. (2008). Thinking globally, acting locally—institutionalizing climate change at the local government level in Durban, South Africa. *Environment and Urbanization, 20(2)*, 521-537.
- Robson, C. (2011). *Real world research: A resource for users of social research methods* (3 ed.). West Sussex: John Wiley and Sons.
- Rodrigues, S. B., & Child, J. (2012). Building Social Capital for Internationalization. <http://www.anpad.org.br/rac> [Accessed on 5 September 2012].
- Rodriguez-Pose, A., & Tijmstra, S. (2005). Local Economic Development as an alternative approach to economic development in sub-Saharan Africa *World Bank-Netherlands Partnerships Program: Evaluating and Disseminating Experiences in Local Economic Development, Local Economic Development as and alternative approach to economic development in sub-Saharan Africa.* Washington DC: World Bank.

- Rogerson, C. M. (2006). Local economic development in post-apartheid South Africa: A ten-year research review. In V. Padayachee (Ed.), *The development decade? Economic and social change in South Africa, 1994–2004*. Cape Town: Human Sciences Research Council
- Rogerson, C. M. (2008). Consolidating local economic development in post-apartheid South Africa. *Urban Forum*, 19(3), 307-328.
- Rogerson, C. M., & Rogerson, J. M. (2010). Local economic development in Africa: global context and research directions. *Development Southern Africa*, 27(4), 465-480.
- Romero-Lankao, P., & Qin, H. (2011). Conceptualizing urban vulnerability to global climate and environmental change. *Current Opinion in Environmental Sustainability*, 3(3), 142-149.
- Romero-Lankao, P., & Tribbia, J. (2009, 28-30 June 2009 ). *Assessing patterns of vulnerability, adaptive capacity and resilience across urban centers*. Paper presented at the Fifth Urban Research Symposium. Cities Climate Change: Responding to an Urgent Agenda, Palais du Pharo, Marseille, France.
- Rostila, M. (2010). The Facets of Social Capital. *Journal for the theory of social behaviours*, 41(3), 308-326.
- Roux, N. (2009). *Speaking of Freedom? heritage, memory and public remembering in Kliptown*. (Master of Arts in Heritage Studies), University of the Witwatersrand, Johannesburg.
- Roy, A. (2005). Urban informality. *Journal of American Planning Association*, 71(2), 147-158.

- RSA. (1996). *Constitution of the Republic of South Africa, Act 108 of 1996*. Pretoria: Government Printer.
- Samaratunge, R., & Pillay, S. (2011). Governance in Developing Countries: Sri Lanka and South Africa Compared. *International Journal of Public Administration*, 34(6), 389-398.
- Satterthwaite, D. (2010). The contribution of cities to global warming and their potential contributions to solutions. *Environment and Urbanization Asia*, 1(1), 1-12.
- Saunders, M., Lewis, P., & Thornhill, A. (1997). *Research methods for business students* (1 ed.). London: Pearson Education Limited.
- Scott, L. (2006). Chronic Poverty and the Environment: a Vulnerability Perspective. In C. P. R. Centre (Ed.), (Vol. CPRC Working Paper 62). London: Overseas Development Institute.
- Selmezi, A. (2011). 'From shack to the Constitutional Court': The litigious disruption of governing global cities. *Utrecht Law Review*, 7(2), 143-144.
- Shackleton, S., Ziervogel, G., Sallu, S., Gill, T., & Tschakert, P. (2015). Why is socially-just climate change adaptation in sub-Saharan Africa so challenging? A review of barriers identified from empirical cases. *Wires Climate Change*, 6(3), 321-344.
- Shortt, & Hammett. (2013). Housing and health in an informal settlement upgrade in Cape Town, South Africa. *Journal of Housing and the Built Environment*, 28, 615-627.



- Sihlongonyane, M. F. (2015). A critical overview of the instruments for urban transformation in South Africa. In C. Haferburg & M. Huchzermeyer (Eds.), *Urban governance in post-apartheid South Africa: Modes of engagement in South Africa's Metropolis* (pp. 40 - 59). Pietermaritzburg: University of Kwazulu-Natal Press
- Smit, B. (2008). Adaptation in the Arctic. *Tiempo*, 68. <http://www.tiempocyberclimate.org/portal/archive/pdf/tiempo68low.pdf>. [Accessed on 24 July 2012].
- Smit, B., Pilifosova, O., Burton, I., Challenger, B., Huq, S., Klein, R. J., . . . Wandel, J. (2001). Adaptation to climate change in the context of sustainable development and equity. In J. J. McCarthy, O. F. Canziani, N. A. Leary, D. J. Dokken & K. S. White (Eds.), *Climate Change 2001: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press.
- Smit, B., & Wandel, J. (2006). Adaptation, adaptive capacity and vulnerability. *Global Environmental Change*, 16(3), 282-292.
- Smith, D. M. (Ed.). (2003). *Urban fragmentation, inequality and social justice: ethical perspectives*. Cape Town University of Cape Town Press.
- Sridhar, K., Reddy, A. V., & Srinath, P. (2013). Is it Push or Pull? Recent Evidence from Migration into Bangalore, India. *Journal of International Migration and Integration*, 14(2), 287-306. doi: 10.1007/s12134-012-0241-9

- SSA. (2006). *Migration and urbanization in South Africa*. Pretoria: Statistics South Africa.
- Stern, N. (2007). *The economics of climate change: The Stern Review*. Cambridge: Cambridge University Press.
- Storie, M. (2014). Changes in the natural landscape. In P. Harrison, G. Gotz, A. Todes & C. Wray (Eds.), *Changing space, changing city: Johannesburg after apartheid* (pp. 137-175). Johannesburg: Wits University Press
- Svendsen, G. L. H., & Svendsen, G. T. (2004). *The creation of social capital: Entrepreneurship, co-operative movements and institutions*. Cheltenham: Edward Edgar Publishing Limited.
- Sverdlik, A. (2011). Ill-health and poverty: a literature review on health in informal settlements. *Environment and Urbanization*, 23(1), 123-155.
- Tabi, K. A. (2013). *Coping with Weather in Cape Town: Use, Adaptation & Challenges in an Informal Settlement*. (Masters of Arts in Geography and Environmental Studies), University of Western Cape, Cape Town.
- Thomas, A. B. (2004). *Research skills for management studies*. London: Routledge.
- Tomlinson, R., Beauregard, R. A., Bremner, L., & Mangcu, X. (2003). *Emerging Johannesburg: Perspectives of the postapartheid City*. New York: Routledge.

Trah, G. (2004). *Business development services and local economic development. Programme description of GTZ Local Economic Development & Business Development Services Programme*. Pretoria: GTZ South Africa Office.

UN-Habitat. (2003). *The challenge of slums: Global report on human settlements*. London: Earthscan.

UN-Habitat. (2008). *The state of the world's cities: 2008/2009: Harmonious cities*. London: Earthscan.

UN-Habitat. (2009). *Global report on human settlements 2009: Planning sustainable cities*. London: Earthscan.

UN-Habitat. (2010). *The state of the world's cities 2010/2011: Bridging the urban divide*. London: Earthscan.

UN-Habitat. (2011). *Global report on human settlements 2011: Cities and climate change*. London: Earthscan.

UNDP. (2007a). *Human development report 2007/08: Fighting climate change: Human solidarity in a divided world*. New York: United Nations Development Programme.

UNDP. (2007b). *Governance Indicators: A users guide*. New York: UNDP.

- UNDP. (2010). *Screening tools and guidelines to support the mainstreaming of climate change adaptation into development assistance – A stocktaking report*. New York: United Nations Development Programme.
- UNDP. (2014). *Sustaining human progress: Reducing vulnerabilities and building resilience*. New York: United Nations Development Programme.
- UNFCCC. (2007). *Climate change: Impacts, vulnerabilities and adaptation in developing countries*. Bonn: United Nations Framework Convention on Climate Change.
- UNFPA. (2007). *UNFPA State of World Population, 2007: Unleashing the Potential of Urban Growth*. New York: United Nations Population Fund.
- VD. (2004, 28 September – 01 October 2004). *Vienna Declaration on Informal Settlements in South Eastern Europe*, Vienna.
- Vearey, J. (2012). Sampling in an urban environment: Overcoming complexities and capturing differences. *Journal of Refugee Studies*, 25(4), 46-53.
- Vearey, J., Palmary, I., Thomas, L., Nunez, L., & Drimie, S. (2010). Urban health in Johannesburg: the importance of place in understanding intra-urban inequalities in a context of migration and HIV. *Health and Place*, 16(4), 694-702.
- Vincent, K. (2007a). Uncertainty in adaptive capacity and the importance of scale. *Global Environmental Change*, 17(2007), 12-24.

- Vincent, K. (2007b). *Gendered vulnerability to climate change in Limpopo Province, South Africa*. (Doctor of Philosophy at the University of East Anglia), University of East Anglia, United Kingdom.
- Vincent, K., Cull, T., Chanika, D., Hamazakaza, P., Joubert, A., Macome, E., & Mutonhodza-Davies, C. (2013). Farmers' responses to climate variability and change in southern Africa – is it coping or adaptation? *Climate and Development*, 2013, 1-12.
- Warner, K. (2010). Global environmental change and migration: Governance challenges. *Global Environmental Change*, 20(3), 402-413.
- Welman, C., Kruger, F., & Mitchell, B. (2005). *Research Methodology*. Cape Town: Oxford University Press.
- Williamson, T., Hessel, H., & Johnston, M. (2010). Adaptive capacity deficits and adaptive capacity of economic systems in climate change vulnerability assessment. *Forest Policy and Economics*, 15(2010), 160-166.
- Wisner, B. (2003). Sustainable Suffering? Reflections on Development and Disaster Vulnerability in the Post-Johannesburg World. *Regional Development Dialogue*, 24(1), 135-148.
- Woolard, I. (2002). *An overview of poverty and inequality in South Africa*. Unpublished briefing paper. Human Sciences Research Council. Pretoria.
- Yin, R. K. (2009). *Case study research: Design and methods* (4 Ed.). London: Sage Publications, Inc.
- Zhan, S., Anderson, S. G., & Zhan, M. (2011). The Differentiated Impact of Bridging and Bonding Social Capital on Economic Well-Being: An

Individual Level Perspective. *Journal of Sociology & Social Welfare*, XXXVIII(1), 119-142.

Zuma, G. J. (2013). *State of the Nation Address by His Excellency Jacob G Zuma, President of the Republic of South Africa on the occasion of the Joint Sitting of Parliament Cape Town, 13 February 2014*. Cape Town: Government Communication and Information Systems Retrieved from State%20of%20the%20Nation%20Address%20by%20His%20Excellency%20Jacob%20G%20Zuma%202014 copy.

## **PERSONAL COMMUNICATION**

Ahmed, P. (Mr. Ahmed, interview, 23 July 2013, Assistant Director, Spatial Development Framework and Growth Management, City of Johannesburg Offices, Braamfontein, Johannesburg.

Duiker, G. (Mr. Duiker, interview, 23 May 2013). Former Community Member of the Local Ward Committee for Kliptown including Freedom Charter, CEO of Kliptown Our Trust, Kliptown, Johannesburg.

Gwata, M. (Mr. Gwata, interview, 28 May 2013), Programme Manager: Climate Change Adaptation and Policy, City of Johannesburg Offices, Braamfontein, Johannesburg.

Mafokwane, M. (Councillor Mafokwane, interview, 25 May 2013), Msawawa Ward Councillor (Ward 94), Randburg, Johannesburg.

Manzini, K. (Mrs. Manzini, interview, 28 March 2014), Manager Economic Policy and Planning. City of Johannesburg Offices, Braamfontein, Johannesburg.

Phalanndwa, I. (Mr. Phalanndwa, interview, 24 May 2013), Msawawa Former Member of the Local Ward Committee, Msawawa, Johannesburg.

Shai, I. (Mr. Shai, interview, 23 May 2013), Former member of the local ward Committee (Ward 94), Eldorado Park, Johannesburg.

Sibanyoni, P. (Councillor Sibanyoni, interview, 22 July 2013), Ward Councillor (Ward 53), City of Johannesburg Offices, Soweto, Johannesburg.

Vermeulen, L. (Official of the City of Johannesburg, email communication, 17 January 2013).

## **APPENDICES**



**Appendix A: City of Johannesburg Approval Letter**



a world class African city

City of Johannesburg  
Office of the City Manager  
Group Strategy, Policy Coordination and Relations  
Innovation & Knowledge Management Unit

16th Floor A Block  
Metropolitan Centre  
158 Civic Boulevard  
Braamfontein

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South Africa  
2000

Tel +27(0) 11 407 6455  
Fax +27(0) 11 339 1580  
[www.joburg.org.za](http://www.joburg.org.za)

12 September 2012

### To Whom It May Concern

Dear Sir/Madam

#### PERMISSION TO CONDUCT RESEARCH FOR PhD STUDIES

The Innovation & Knowledge Management (IKM) is a unit within the Group Strategy, Policy Coordination and Relations (GSPCR) with the mandate to inculcate a culture and practice of learning and sharing within the organisation including collaborating with relevant external stakeholders and ensure replication and promotion of better practices.

One of our key objectives is to develop and maintain an organisational repository on Research & Development initiatives including reports and studies related to key City initiatives which knowledge can be used and shared for learning purposes.

Our unit has been approached by Mr Mpho Nenweli, a PhD candidate in the School of Planning & Architecture at the University of the Witwatersrand, who is conducting research focusing on the interrelationship between climate change adaptation and informal settlements in the City of Johannesburg. His research involves understanding the nature of adaptive capacity of informal settlements in the City of Johannesburg. The research aims to add to the literature on climate change adaptation and informal settlements. The study will help in widening our understanding on climate change and informal settlements. It will also help in understanding household adaptive capacity.

The findings will be of benefit to the City for our internal learning purposes as well as relevant to policy development and to inform local communities on their adaptation capacities and how they can enhance or optimise them.

It is with this in mind that IKM supports Mr Nenweli's request to engage and interview relevant internal stakeholders within the City of Johannesburg provided that the final PhD report will be shared with the City for our repository purposes.

Your assistance and support during this research period will be greatly appreciated and should you have any further enquiries please do not hesitate to contact me.

Thank you

A handwritten signature in black ink, consisting of several loops and a long horizontal stroke at the end, likely representing the name Pakiso Harvey Phalatse.

**Pakiso Harvey Phalatse, APR**

**Acting Unit Head:  
Innovation & Knowledge Management  
Group Strategy, Policy Coordination and Relations**

**Tel: (011) 407 6771**

## Appendix B: Ethics Clearance



Research Office

**HUMAN RESEARCH ETHICS COMMITTEE (NON MEDICAL)**  
H120902      Nenweli

**CLEARANCE CERTIFICATE**

**PROTOCOL NUMBER H120902**

**PROJECT TITLE**

The adaptive capacity of households in informal settlements  
in relation to climate change: Two cases from Johannesburg

**INVESTIGATOR(S)**

Mr M R Nenweli

**SCHOOL/DEPARTMENT**

Architecture and Planning

**DATE CONSIDERED**

21 September 2012

**DECISION OF THE COMMITTEE**

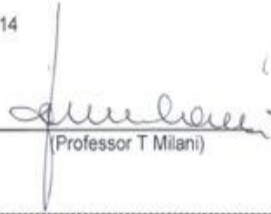
Approved Unconditionally

**EXPIRY DATE**

30 September 2014

**DATE** 27 November 2012

**CHAIRPERSON**

  
(Professor T Milani)

cc: M Huchzermeyer

**DECLARATION OF INVESTIGATOR(S)**

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10005, 10th Floor, Senate House, University.

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to completion of a yearly progress report.**

  
Signature

10, 12, 2012  
Date

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

## Appendix C: Final Household Survey Questionnaire

### HOUSEHOLD SURVEY QUESTIONNAIRE

#### STUDY: THE ADAPTIVE CAPACITY OF HOUSEHOLDS IN INFORMAL SETTLEMENTS IN RELATION TO CLIMATE CHANGE: TWO CASES FROM JOHANNESBURG

#### UNIVERSITY OF THE WITWATERSRAND SCHOOL OF ARCHITECTURE AND PLANNING

My name is Mpho Nenweli, I am a student from the University of the Witwatersrand, School of Architecture and Planning. I am currently conducting a research on informal settlements and climate change adaptation in the City of Johannesburg. The research is specifically focusing on the informal settlements of Freedom Charter Square and Msawawa. The research is part of my studies towards a Doctoral Degree in Town and Regional Planning under the supervision of Professor Marie Huchzermeyer and Dr Katharine Vincent. I would like to request you to be part of the respondents of this study on climate change adaptation. There are no benefits that will be provided for participating as a respondent, apart from contribution to academic research. I would like to inform you that I am committed to ensuring that your name is not used in the study or provided to other people. The information that you will provide will only be used for purposes of this study. The interview will take approximately one and half hour. The target respondent is the household head/spouse/eldest member of the household (male/female/children above 18 years) and this is based on decision-making powers and not income.

Please indicate if you are happy and have the time to be participant in the interview

Yes	No
-----	----

- 0.1. Date of Interview :
- 0.2. Name of area :
- 0.3. Name of interviewer :
- 0.4. Interview start time :
- 0.5. Interview end time :
- 0.6. Questionnaire number :
- 0.7. GPS Coordinates :

## A: HOUSEHOLD DEMOGRAPHIC INFORMATION

1. How many people constitute the household<sup>24</sup> (enter the respondent's details in the table)?

1.1. Household Head or Relationship to HH	1.2. Sex	1.3. Age	1.4. Occupation	1.5. Marital Status	1.6. School Fees (p/m) (leave blank if not applicable)
HH = 1 Spouse = 2 Son = 3 Daughter = 4 Nephew = 5 Niece = 6 Uncle = 7 Aunt = 8 Friend = 9 Other = 10	M = 1 F = 2	0 – 19 = 1 20 – 39 = 2 40 – 59 = 3 60+ = 4	Unemployed = 1 Self-employed = 2 Formal Employment = 3	Single = 1 Married = 2 Divorced = 3 Widow = 4	R 0.00 – R500 = 1 R501 – R1000 = 2 R1001 – R1500 = 3 R1501 – R2000 = 4 R2001+ = 5
<b>1.7. Total members:</b>					

2. Indicate how long have been staying in this area?

Years	Code	Tick appropriate area
> 3 months	1	
1 – 5	2	
>5	3	

3. Do you have any members of your family or friends who are planning to join your household?

Yes = 1	No = 2
---------	--------

<sup>24</sup> In this study the household head is the main decision-maker who can be male or female. This will also include child-headed households managed by children above 18 years. This can happen in situations where children are orphans. In a situation where the household is composed of unrelated people the oldest member will be interviewed. In this study the term household is used to refer to people residing together and therefore it excludes people residing elsewhere. If the household head is not there, the spouse will be interviewed.

3.1. If yes, for what reason? (e.g., study, work)?

\_\_\_\_\_

4. Do you have any members of the family who have joined the household to stay from another area?

Yes = 1	No = 2
---------	--------

4.1. If yes, indicate how many in the following table.

Number	Code	Tick appropriate area
1	1	
2	2	
3+	3	

5. Do you have any members of the family who are planning to leave the household to stay in another area?

Yes = 1	No = 2
---------	--------

5.1. If yes, indicate how many in the following table.

Number	Code	Tick appropriate area
1	1	
2	2	
3+	3	

## B: SOCIO-ECONOMIC ISSUES, SOCIAL CAPITAL AND LIVELIHOODS

6. What are the main sources of income in your household?

6.1. Fill in the following table.

6.1.1. Source of income	Y= 1 N = 2	6.1.2. Indicate how many individuals of the household
Formal Employment = 1		
Own business = 2		
Other (specify) = 3		

6.2. If members of the household derive income from grants indicate in the following box.

6.2.1. Type of Grant	Y=1 N=2	6.2.2. Number of household members
Child Support Grant = 1		
Care Dependency Grant = 2		
Old Age Grant = 3		
War Veterans Grant = 4		
Grant-in-aid = 5		
Social relief of distress = 6		
Disability Grant = 7		

7. Does your household receive any remittances?

Yes = 1	No = 2
---------	--------

7.1. If yes, tick in the following box.

7.1.1.Amount	Codes	Tick	7.1.2.Period of receiving	Tick
<R500	1		Weekly = 1	
R501 – R1000	2		Monthly = 2	
R1001 – R1500	3		Annually = 3	
R15001+	4		Other = 4	

8. What is the monthly household income<sup>25</sup>?

Income	Codes	Tick

<sup>25</sup> This includes any form of income including grants, formal jobs, informal earnings and others.



<R1000	1	
R1001 – R4000	2	
R4001+	3	

9. Asset ownership.

9.1. What assets do your household own (in the City of Johannesburg or other areas?)

	Animals (goats, sheep, poultry, cattle, donkeys, horses, etc.) = 1	Car = 2	Shop = 3	Other (specify) = 4
9.1.1. Yes = 1 No = 2				
9.1.2. Quantity (Indicate how many)				

9.2. Indicate ownership of dwellings in the following table.

Dwellings <sup>26</sup> (Indicate yes/no in the spaces below)		
Code: Yes = 1 No = 2		
9.2.1. This dwelling	9.2.1. Another dwelling in the same settlement	9.2.3. Another dwelling elsewhere outside this settlement
	9.2.4. Indicate below the number of dwellings in the same settlement that you own.	9.2.5. Indicate below the number of dwellings elsewhere outside this settlement that you own.

10. What is the predominant roof material and wall material of the dwelling where the household is staying<sup>27</sup>?

10.1. Dwelling Type		Y = 1 N = 2	10.2. Explanation (if any)
Roof material	Zinc = 1		
	Tiles = 2		
	Zinc and plastic = 3		
	Other = 4		
Wall structure	Brick = 1		

<sup>26</sup> A dwelling is occupied by one household. Also note that the house can also be used as a shop. If it's the case please indicate in the box.

<sup>27</sup> The interviewer will observe the housing structure and write the description. The respondent will not be asked.

	Zinc = 2		
	Plastic = 3		
	Other = 4		
Floor structure	Concrete = 1		
	Tiles = 2		
	Nothing = 3		
	Other = 4		

10.3. In your perception, is your house/dwelling strong enough to endure the following conditions:

<b>10.3.1. Condition</b>	Yes = 1 No = 2	<b>10.3.2. Explanation (if any)</b>
Strong winds = 1		
Heavy Rain = 2		
Fire = 3		
Flood = 4		

10.4. Indicate the type of sanitation that you use in the following table.

<b>Sanitation Type</b>	Yes = 1 No = 2
Open veld = 1	
Chemical/bucket toilet = 2	
Self-made pit = 3	

10.5. What source of drinking water do you use?

<b>Source of water</b>	Yes = 1 No = 2
Bottled water = 1	
Household tap = 2	
Public tap = 3	
River = 4	

11. Provide the number of family members suffering from the following conditions and illnesses (if any).

<b>11.1. Illness</b>	Yes = 1 No = 2	<b>11.2. Number of household members</b>

High or low blood pressure = 1		
Heart problems = 2		
Diabetes = 3		
HIV&AIDS = 4		
Depression or mental illness = 5		
Alcohol abuse = 6		
Drug abuse = 7		
Tuberculosis (TB) = 8		
Disability = 9		
Others (specify) = 10		

12. Indicate if you contact the following people outside of this settlement for assistance during times of need.

<b>12.1. People to contact in Johannesburg</b>	<b>Yes = 1 No = 2</b>	<b>12.2. List the type assistance your receive from them</b>
Family member = 1		
Friend = 2		
Government Official (Indicate the people and portfolio or where they work) = 3		
Other (specify) = 4		

<b>12.3. People to contact outside of Johannesburg</b>	<b>Yes = 1 No = 2</b>	<b>12.4. List the type assistance your receive from them</b>
Family member = 1		
Friend = 2		
Government Official (Indicate the people and portfolio		

or where they work) = 3		
Other (specify) = 4		

13. Did the well-being of your household improve over the past ten years?

Yes = 1	No = 2
---------	--------

13.1. If yes, indicate the appropriate area in the box below.

Area of improvement	Code	Tick appropriate area
Finance	1	
Housing	2	
Health	3	
Education	4	
Others (specify)	5	

14. Indicate socio-economic factors have impacted on the well-being of your family and livelihoods.

14.1. Factor	Yes = 1 No = 2	14.2. Positive impact on the household	14.3. Negative impact on the household (if any)
Crime = 1			
Xenophobia = 2			
Unemployment = 3			
Health = 4			
Death of a family member = 5			
Others (specify) = 6			

15. Do you have any debts that you are paying at the moment?

Yes = 1	No = 2
---------	--------

15.1. If yes, indicate how much you are paying per month?

Amount per month (in Rands)	Code	Tick
<1000	1	

1001 – 2000	2	
2001 – 4000	3	
4001+	4	

16. Do you belong to any of the following social groups?

<b>16.1. Group</b>	<b>Yes = 1 No = 2</b>	<b>16.2. Elaborate on the kind of support you receive</b>
Burial scheme = 1		
Stokvel = 2		
Grocery Scheme = 3		
Church group = 4		
Music group = 5		
Youth club = 6		
Sports club = 7		
Others (specify) = 8		

**C: ENVIRONMENTAL ISSUES AND DISASTERS**

17. Has your household ever been affected by strong winds in the past ten years? (If yes, complete the table below).

Yes = 1	No = 2
---------	--------

17.1. Number of times exposed to strong winds (past ten years) (if there was no exposure leave blank).	17.2. Impact	Yes = 1 No = 2	17.3. Response to the situation (Also find out the difference between what they wanted to do to respond and how they responded. Also find out the cause of that difference)	17.4. List any changes in the manner in which you would handle the impact of strong winds today as compared to the past?	17.5. Indicate if you have received any help to respond to strong winds from the following organizations/government (Indicate if it was government, NGO, CBO, Church or Other)
	Injury = 1				Code Government = 1 Non Government Organization = 2 Community Based Organisation = 3 Church = 4 Other = 5
	House damaged = 2				
	Belongings damaged = 3				
	Couldn't get to work = 4				

18. Has your household ever been affected by heat, cold, floods and drought in the past ten years? (If yes, complete the table below).

Yes = 1	No = 2
---------	--------

Event	18.1. Number of times exposed to the conditions/events (past ten years) (if there was no exposure leave blank)	18.2. Impact	18.3. Response to the situation (Also find out the difference between what they wanted to do to respond and how they responded. Also find out the cause of that difference)	18.4 List plans that you have made to prevent your future exposure to the same conditions/events	18.5. Indicate if you have received any help to respond to the mentioned conditions/events from the following organizations/government Government = 1 Non Government Organization = 2 Community Based Organisation = 3 Church = 4      Other = 5
Extreme Heat = 1					
Extreme cold = 2					
Flooding = 3					
Drought = 4					

19. Has your household ever been affected by rainfall in the past ten years? (If yes, complete the table below.)

Yes = 1	No = 2
---------	--------

Event	19.1. No. of times exposed to extreme rainfall related (past ten years) (if there was no exposure leave blank)	19.2. Impact	19.3. Response to the situation (Also find out the difference between what they wanted to do to respond and how they responded. Also find out the cause of that difference)	19.4. List plans that you have made to prevent your future exposure to the same conditions/events	19.5. Indicate if you have received any help to respond to extreme rainfall from the following organizations/government Government = 1 Non-Government Organization = 2 Community Based Organisation = 3 Church = 4 Other = 5
Heavy downpour/storm = 1					
Hail storm = 2					



20. Has your household ever been affected by fire in the past ten years? (If yes, complete the table below).

Yes = 1	No = 2
---------	--------

20.1. Impact (Have you ever been exposed to the following situations related to fire) (Tick appropriate area)	20.2. No. of times exposed to fire (past ten years)	20.3. Response to the situation (Also find out the difference between what they wanted to do to respond and how they responded. Also find out the cause of that difference)	20.4. List plans that you have made to prevent your future exposure to the same situations	20.5. Indicate if you have received any help to respond to fire from the following organizations/government (Indicate if it was government, NGO, CBO, Church or Other) Government = 1 Non-Government Organization = 2 Community Based Organisation = 3 Church = 4 Other = 5
Loss of life = 1				
Injury = 2				
Damage/Loss to property = 3				
State of Insecurity/Feeling insecure = 4				
Other = 5				

21. Are there any collective actions taken by the community to address any disasters related to extreme events (*i.e.*, fire or weather related)?

Yes = 1	No = 2
---------	--------

21.1. If yes, list them? \_\_\_\_\_

21.2. Have you modified your dwelling or surrounding environment to respond to any extreme events (*i.e.* fire or weather related)?

Yes = 1	No = 2
---------	--------

21.3. If yes, explain what you have done?

\_\_\_\_\_

22. Before this interview, were you aware of any change from year to year in weather patterns?

Yes = 1	No = 2
---------	--------

22.1. If yes, indicate any emerging challenges that you might have noticed in this area over the years that are related to extreme weather events?

\_\_\_\_\_

23. Have you ever heard about climate change<sup>28</sup>?

Yes = 1	No = 2
---------	--------

23.1. If yes, what is your understanding of climate change<sup>29</sup>?

\_\_\_\_\_

24. In your view, is climate change one of the challenges that you are facing as a community?

Yes = 1	No = 2
---------	--------

24.1. If yes, explain how?

\_\_\_\_\_

<sup>28</sup> The interviewer must explain climate change again.

<sup>29</sup> At this point the interviewer will repeat the official definition in simple terms to ensure clarity for next questions.

24.2. If yes, indicate what you think the City of Johannesburg or other government agencies can do to help you to address challenges related to climate change?

---

## D: GOVERNANCE

25. What is the name of your Ward Councillor?

\_\_\_\_\_

26. How do you make contact with the City of Johannesburg?

Contact people	Code	(Tick appropriate answer)
Councillor	1	
Community Development Worker	2	
Regional Office	3	

27. Rate the following services that you get from the government.

Government Services	27.1. Where applicable indicate the estimate amount of people who share (if not applicable skip)	27.2. Where applicable indicate how long it takes you to access the service	27.3. Rating of service quality (rate from 1-10) 1= poor 10 = very good
Water = 1	Tap water		
	Water tank		
	Water truck		
Electricity supply = 2			
27.4. Indicate how often do you get services in a month on the following (applicable if using bucket/chemical toilet).			
Sanitation = 3			
Waste removal = 4			
Others (specify) = 5			

28. Do you know about the Integrated Development Planning (IDP) processes conducted by the City of Johannesburg?

Yes = 1	No = 2
---------	--------

28.1. If yes, do you participate in the processes?

Yes = 1	No = 2
---------	--------

29. Is the City of Johannesburg supporting the local community on Local Economic Development (LED)<sup>30</sup>?

Yes = 1	No = 2
---------	--------

29.1. If yes, what are the projects that are being supported that you are aware of?

---

29.2. How is the local community benefiting from these projects?

---

30. Are there any emerging challenges that your community is facing on its relationship with the government?

Yes = 1	No = 2
---------	--------

30.1. If yes, what are the challenges?

---

---

30.2. How is the community addressing these challenges?

---

30.3. Do you get any assistance from local community leaders to address the above listed challenges?

Yes = 1	No = 2
---------	--------

30.4. If yes, give examples of challenge and what was done?

---

---

<sup>30</sup> LED in this case means activities conducted to promote inclusive local economic situation with the aim of improving competitiveness, create jobs and improve income.

31. Have you ever had any experiences where the local community was in conflict<sup>31</sup> with the government or City of Johannesburg in particular?

Yes = 1	No = 2
---------	--------

31.1. If yes, what were the issues causing the conflict?

---

31.2. Was the conflict resolved?

Yes = 1	No = 2
---------	--------

31.3. If yes, how was the conflict resolved?

---

32. What do you think is your future in this settlement?

---

---

33. Do you have any comments or questions to ask?

Yes = 1	No = 2
---------	--------

33.1. If yes, provide more information.

---

---

---

Would you be willing to participate in a focus group discussion<sup>32</sup>?

Yes = 1	No = 2
---------	--------

---

<sup>31</sup> In this context conflict means disagreements that may sometimes have resulted in protests or they have been resolved amicably through dialogue.

<sup>32</sup> A **focus group** is a form of qualitative research in which a group of people are asked about their perceptions, opinions, beliefs, and attitudes towards a product, service, concept, advertisement, idea, or packaging. Questions are asked in an interactive group setting where participants are free to talk with other group members.

**Appendix D: Key informant interviews themes**  
**Research Instrument: Semi-structured interviews and Focus Group Discussions**

**1. Key Respondents:**

The respondents will fall into three main categories:

**a. Government officials:**

- City of Johannesburg Housing (one informant)
- City of Johannesburg Local Economic Development (LED) (one informant)
- City of Johannesburg (Climate Change Adaptation expert)

**b. Community leaders in the informal settlements:**

- Local Councillors
- Local Civic Leaders

**3. The Semi-Structured Interviews**

**Themes and topics for the City of Johannesburg Climate Change Adaptation Expert Introduction**

Explaining what the study is about and target areas.

**Areas of discussion:** CoJ Policy on Climate Change Adaptation, initiatives and household adaptive capacity.

**Discussion points:**

- Linkages between city policies/plans and national/provincial policies/plans (CoJ CC Adaptation Strategy, Gauteng Climate Change Strategy, NCCRP);
- Extent to which climate change is integrated into planning and how;
- Understanding of the City of Johannesburg's Climate Change Adaptation Strategy in relation to informal settlement communities;
- Potential consequences and implications of climate variability on informal settlement communities in the City of Johannesburg;
- Ways to address the potential impacts of climate variability;
- Initiatives that they are aware of on climate change adaptation that the City of Johannesburg is implementing or planning to implement targeting informal settlements;
- What can be done to build the adaptive capacity of informal settlement communities ; and
- CoJ support to informal settlement communities after shocks that include extreme weather events?
  - a. Which CoJ departments are involved?
  - b. How do they ensure that the interventions reach the most vulnerable communities in the CoJ?
- Any comments or questions.

## **Themes and topics for the City of Johannesburg LED Expert**

### **Introduction:**

Explaining what the study is about and target areas.

**Areas of discussion:** LED policy, informal settlements and climate change adaptation.

### **Discussion points:**

- Broad explanation on the City's LED Strategy and relation with households in informal settlement
- Also indicate that I have observed various economic activities in informal settlements and their significance for survival. Is the CoJ helping in some way?
- City of Johannesburg's policy position on LED focusing on informal settlements (if any);
- Impacts of the City of Johannesburg's LED activities on lives and livelihoods of local communities. How they are monitored and evaluated (information will be compared with survey results);
- LED activities in informal settlements specifically focusing on Msawawa and Freedom Charter Square;
- Potential consequences and implications of climate variability on informal settlement communities in the City of Johannesburg and how they can be addressed through LED; and
- Significance of LED activities in enabling informal settlement communities to build their adaptive capacity and to respond to climate change. The focus will mainly be on Msawawa and Freedom Charter Square.



## **Themes and topics for the City of Johannesburg Housing Expert**

### **Introduction:**

Explaining what the study is about and target areas.

**Areas of discussion:** policy approach on informal settlements and any recent changes, Msawawa and Freedom Charter Square, climate change implications on informal settlements (Awareness on any debates on housing and CC).

### **Discussion points:**

- City of Johannesburg's policy position on housing focusing in informal settlements (Policy positions, successes and challenges);
- City plans for Msawawa and Freedom Charter Square (CoJ 2010 informal settlements database and any new resolutions);
- Environmental conditions and implications on quality of life at Msawawa and Freedom Charter Square;
- Government housing and climate change;
- Potential consequences and implications of climate variability on informal settlement communities in the City of Johannesburg and how they can be addressed; and
- Housing in informal settlement communities and building of the adaptive capacity and response to climate variability (understanding and role of CoJ).
- Any comments or questions.

## **Themes and topics for the City of Johannesburg Ward Councillors for Msawawa and Freedom Charter Square**

### **Introduction:**

Explaining what the study is about and target areas.

**Areas of discussion:** Historical background, implications of climate variability on informal settlements and policy.

### **Discussion points:**

- Understanding of the history of the informal settlement, socio-economic conditions and dynamics;
- Local challenges and how they are being addressed by the various stakeholders (CoJ, community, NGOs, *etc*);
- CoJ's policy position on the informal settlement and future plans;
- Knowledge of any disasters and impacts that have been experienced in the past few years and how they were addressed (including their perspective on government support (This will be cross-checked with what is cited by the city officials above));
- Potential consequences and implications of climate variability on informal settlement communities in the City of Johannesburg and how they can be addressed;
- To what extent do they see climate change as a risk to the settlements relative to other risks; and
- Practically what can be done to help local communities to address climate change related consequences.
- Involvement of local community in the IDP process.
- Any comments or questions.

## **Themes and topics for the Informal Settlement Community Leaders**

### **Introduction:**

Explaining what the study is about and target areas.

**Areas of discussion:** historical background, implications of climate variability on informal settlements and policy.

### **Discussion points:**

- Settlement history, dynamics and local socio-economic conditions;
- Local challenges (*i.e.* socio-economic, environmental, *etc*) and how they are being addressed by the various stakeholders (government, community, NGOs, *etc*);
- Relationship between the community and the government (City of Johannesburg);
- Recent protests and causes;
- Disasters in the past ten years and how they were addressed;
- Risks that people face in the settlement and how they affect their lives (these can be incremental risks like increasing frequency of winds and storms);
- Participation of local community in City planning and climate change; adaptation policy formulation;
- Potential consequences and implications of climate variability on the informal settlement community and how they can be addressed; and
- Government support to the local community on LED and Climate Change.
- Any comments or questions.

Appendix E: Example of the map used for the survey

Freedom Charter Square Aerial Map

