

AFRICAN INDIGENOUS FOOD SECURITY STRATEGIES AND CLIMATE CHANGE
ADAPTATION IN SOUTH AFRICA

By

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Supervisor

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DECLARATION

I Gaoshebe Tlhompho hereby declare that this research report is my own original work, and that all sources that consulted have been duly acknowledged. I further declares that this research it has not been submitted for a degree in any other University.

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Signature

Date

This dissertation has been submitted for examination with my approval as the University Supervisor.

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Signature

Date

DEDICATION

The study is dedicated to the community knowledge holders and practitioners of Ganyesa Village, North West Province (South Africa) who sacrificed their time to participate in this study. This study is also a tribute to my late Father, Kenewang Gaoshebe for his spiritual guidance.

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LIST OF ACRONYMS

FAO: Food Agricultural Organization

IK: Indigenous Knowledge

IKS: Indigenous Knowledge Systems

IPCC: Intergovernmental Panel on Climate Change

NRF: National Research Foundation

NWP: North West Province

UNFCCC: United Nations Framework Convention on Climate Change

ABSTRACT

The study used predominantly a qualitative and participatory research design to investigate the African Indigenous Food Security Strategies and Climate Change Adaptation in Ganyesa village (North-West Province). Qualitative research methods such as in-depth interviews, focus group discussions, direct and participatory observation formed the core of data collection methods. This enabled the researcher to interact meaningfully with the respondent IK holders and practitioners in the research process. In consultation with the community leaders a purposive sample of 40 key informants (15 men and 25 women) as IK holders and practitioners was selected for the study. Emphasis was put on women IK holders and practitioners as the custodians of IKS related to food security for climate change adaptation. They were the main subsistence farmers who ensured food security for their households and the community in changing climatic conditions. Moreover, contrary to western ways of knowing and knowledge production, the socio-economic and demographic characteristics of the respondent IK holders and practitioners such as age group, marital status, etc. and other relevant data were collected and interpreted from their own cultural perspectives and in their local indigenous language Setswana. This was to ensure that cultural meanings are not distorted and lost.

The study found that subsistence farming methods such as mixed cropping including keeping of livestock, hunting and gathering constituted main sources of food supply in changing climate conditions in the arid environment of the study area. It was also revealed that the respondent women IK holders and practitioners had a rich and wide knowledge of selecting appropriate seeds and animal species for different seasons and climatic conditions; use of wind patterns, position of stars and behavior of living organisms, early warning systems and indicators for changing climatic conditions. However, during focus group discussions and in-depth interviews, it was found that one of the major limitations for IKS sustainability in the study community was the lack of interest among the younger generations in IKS. This was due to exposure to western knowledge systems and the impact of globalization through mass media.

The study recommends that existing indigenous knowledge on food security systems for climate change adaptation in the community should be documented. This is meant to ensure its sustainability, protection and to be shared with younger generation including extension

workers and policy makers. Documentation will also assist in identification of gaps which could be improved through interface with other knowledge systems to meet the challenges of globalization. These knowledge systems should also be introduced in the formal educational system and developmental policy including agricultural campaigns to promote public knowledge and awareness on the importance of IKS for sustainable development and livelihood. The role of gender should be taken seriously in the documentation, promotion and interface of IKS with other knowledge and technology. This is to ensure that they are not marginalized further and alienated.

CHAPTER ONE

INTRODUCTION

1.1 Background

Climate change and food security are critical issues in many parts of the world. Studies in various parts of the developing regions, and Africa in particular, show that climate change has serious environmental, economic, social and cultural impacts on the lives of people and communities (Hinzman et al. 2005, Ford et al. 2008, Ford 2009). One of the major impacts of climate change is on food security systems because a large number of people depend on agriculture as their primary source of livelihood (Food and Agriculture Organization (FAO), 2008). Therefore, as agricultural production is adversely affected by climate change, the livelihoods of people who depend on it will be at risk.

Food security is a broad term, which is defined in different ways. According to the World Food Summit (2001/2):

“Food security is a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.”

The World Bank adds to the concept by indicating that the food available should also be culturally and environmentally appropriate. People have different cultures and live in different environments including climatic conditions and hence their food needs, preferences and habits are different (Liu et al. 2008). This conceptualization implies that food security goes beyond providing people's sustenance.

This study maintains the view that most conceptualizations of food security are based on western values which tend to marginalize other non-western cultures, ways of knowing and value systems. Furthermore it argues that the definition and conceptualization of food security should be culturally-based. In South Africa, for example, the Batswana and Zulu ethnic groups live in different environmental conditions and have different cultures implying that each ethnic group should be assessed individually and not as a monolithic block.

The Batswana of South Africa live in an arid area in the North-West Province. The average annual rainfall differs between 700 mm in the east to less than 300 mm in the west. The vegetation category changes accordingly from temperate grasslands in the east to arid bush

and shrub veld in the west. This east-west difference in rainfall and vegetation categories guides the nature of agricultural activity. The major agricultural activity in the North West Province includes mixed crop in the eastern regions such as in Zeerust and livestock farming in the western regions such as in Vryburg.

As a result of the low rainfall, commercial forestry is absent in the North West Province (Department of Agriculture Conservation and Environment, 2008). Small-scale farmers in the province are mainly subsistence in nature and rely predominantly on rain fed production (National Department of Agriculture (NDA), 2004). Sorghum is the indigenous staple food due to its drought resistant nature.

The Zulu live in a coastal, tropical environment (with an average annual rainfall of 1000mm) growing a variety of food crops due to abundant rainfall. Makela, (2000) elaborates how the two cultural groups differ in the way they identify foods and prepare them, the condiments used, and the timing and frequency of meals based on their cultural acceptance, norms and values. This study investigates the indigenous food security strategies and climate change adaptation among the Batswana Barolong Boora- Tlou le Tau in Ganyesa village (North-West Province).

On the concept of climate change the study argues that there is no internationally agreed definition. Instead there are various perspectives on the causes and impacts of climate change. Some scholars put emphasis on natural causes while others argue that the causes are human made, while others including this study attribute the causes to a combination of both factors.

For instance, the Intergovernmental Panel on Climate Change (IPCC) (2007) looks at climate change as:

Any change in climate over time, whether due to natural variability or as a result of human activity. Human activities including the burning of coal, oil, and natural gas, as well as deforestation and various agricultural and industrial practices, are altering the composition of the atmosphere and contributing to climate change.

The United Nations Framework Convention on Climate Change (UNFCCC) (2007) on the other hand emphasises human activity as the main instigator behind the alteration of atmospheric composition and climate variability.

In the context of African indigenous ways of knowing and value systems, this study argues that in most African cultures including the Batswana, conceptualization of climate change and its impact on food security and other aspects of community livelihood also have a spiritual dimension. For instance, Notsi (2012) shows that among the Batswana certain climatic conditions such as floods and drought are attributed to the anger of ancestors due to the breaching of taboos such as hunting at certain forbidden times, harvesting certain plants or eating certain foods.

Climate change is a potential threat to the South African food security agenda because of its impact on agriculture, especially among small scale farmers. The higher temperatures reduce the impact of rainfall on agricultural production, both crop and animal production in the arid areas of the country particularly in the dry north western parts including Ganyesa.

Cumhur et al. (2008) reveal that the higher temperatures cause declines in dairy production as well as a reduction in animal weight gain and reproduction. The climate change risk to food security in the area is that it affects livestock through various animal diseases since most animal diseases are spread by vectors such as ticks and flies. Lunde and Lindtjorn (2013) show that cattle, goats, horses and, sheep in the area are also at risk of acquiring a wide range of nematode worm infections, most of which have their growth phases influenced by changing climatic conditions.

Furthermore, Zinn et al. (2010) indicate that higher temperatures increase heat stress in plants which in some cases causes plants to be unable to reproduce at all since extreme heat causes sterility of the pollen. As a consequence certain food crops become scarce at certain times of the year due to their vulnerability to changing climatic conditions (Chhetri and Chaudhary, 2011).

However, the extent to which these effects of climate change on food security are felt depends in large part on the extent of adaptation strategies to climate change. Studies suggest that climatic changes are not entirely beyond local farmers' control. African indigenous small scale farmers have over centuries developed local strategies of adaptation to climate change (Nyong and Osman, 2007; Mortimore and Adams, 2001). They have a lot to offer with regard

to adaptation strategies to climate change such as knowledge of early warning systems and long-term experience in coping with climatic variability.

These community-based knowledge systems include early-warning systems and long-term experience in coping with climatic variability. These adaptation strategies constitute their indigenous knowledge systems (IKS). Hunn (2004) defines IKS as bodies of knowledge, skills and beliefs produced locally and traditionally transmitted orally from one generation to the other.

1.2. Problem Statement

One of the most devastating results of colonization and apartheid in South Africa was the destruction of indigenous peoples' economic systems, including their maintenance of food security under changing climatic conditions. This is in spite of the fact that a large part of the populace in the rural areas of South Africa, including Ganyesa, depend on these systems for food security and climate change adaptation. These systems have ensured food security while conserving the environment as the main source of livelihood.

However, these indigenous food security strategies for climate change adaptation systems, especially those held by women, have not been adequately researched and documented to inform policy development and to be shared with younger generations for sustainability. This is due to the marginalization of these knowledge systems as unscientific and incapable of meeting the challenges of the 21st century.

1.3. Rationale of the study

In most areas of South Africa including Ganyesa village, women are the major subsistence farmers providing the basis of household and community sustainable livelihoods. The majority of them depend on their local community-based agricultural knowledge and innovation systems for agricultural production. The researcher grew up in Ganyesa village, where subsistence farming has been the core of both the household and community economies. For many years, local people in Ganyesa especially women have always relied on them to grow, preserve and store their own food using indigenous food security strategies under changing climatic conditions including natural resources such as land for livelihood. They have developed knowledge over long periods about changes in the environment.

The fact that indigenous knowledge (IK) is mostly stored in people's minds and traditionally transmitted through generations by word of mouth rather than in written form means it is at risk of rapid change and extinction. Indigenous knowledge is mostly found in the elders of the community, hence threatening its sustainability and minimizing its potential to contribute to the global pool of knowledge. It is, therefore important that these indigenous food security strategies for climate change adaptation be adequately documented to inform policy development and to be shared with the younger generations for sustainability. The documentation of these indigenous food security strategies for climate change adaptation will also provide new knowledge for researchers and students.

1.4. Objectives and Research Questions of the Study

The general objective of the study was to examine the efficacy of African indigenous food security strategies and climate change adaptation in South Africa with special reference to Ganyesa village (North-West Province).

The study interrogated the following questions:

1. What are the community perspectives on the role of socio-economic and demographic characteristics such as age group, marital status, education, religious affiliation, household size in relation to African indigenous food security strategies and climate change adaptation?
2. What types of African indigenous food security strategies for climate change adaptation are found in the study community?
3. What are the indigenous community sources of food security for climate change adaptation?
4. What are the prospects and challenges of the indigenous food security strategies for climate change adaptation in the study community?

1.5. Study Site

This study investigates the indigenous food security strategies and climate change adaptation among the Batswana Barolong Boora- Tlou le Tau in Ganyesa village (North-West Province). Ganyesa is located in Kagisano Molopo Local Municipality in the south-western

part of the provincial capital Mafikeng, North West Province (South Africa). Ganyesa is inhabited by the Barolong tribe of the Tlou and Tau clan. It is a governmental centre for the far north-western area of the province, hosting the head offices of the Kagisano Molopo Local Municipality, a magistrate court and different national and provincial government offices. According to the census (2011), Ganyesa is a village of about 19,290 people of whom the vast majority are black (98% and Setswana speaking (93%) while 3.4% speak Afrikaans and 1.6% speaks English.

Ganyesa is a semi-arid area receiving on average about 300mm of rain with most rainfall occurring mainly during summer. The normal noon temperatures vary from 19 degrees Celsius in June to 32.9 degrees Celsius in January. It is located in a savannah biome and consists of Kalahari thorn veld and shrub bush veld type (Acocks, 1988, Hundson, 2002). Ganyesa forms part of the provincial capital Mafikeng Bush veld vegetation unit (Mucina and Rutherford, 2006). Ganyesa does not have enough rainfall or fertile soil to sustain large crop production (SADA, 1999). Thus, the vast majority of the population depends on small scale agriculture (mainly cattle, sheep and goats) with limited amount of crop production for their economic community and household livelihood (Boone et al, 2004).

1.5. Organisation of the Study

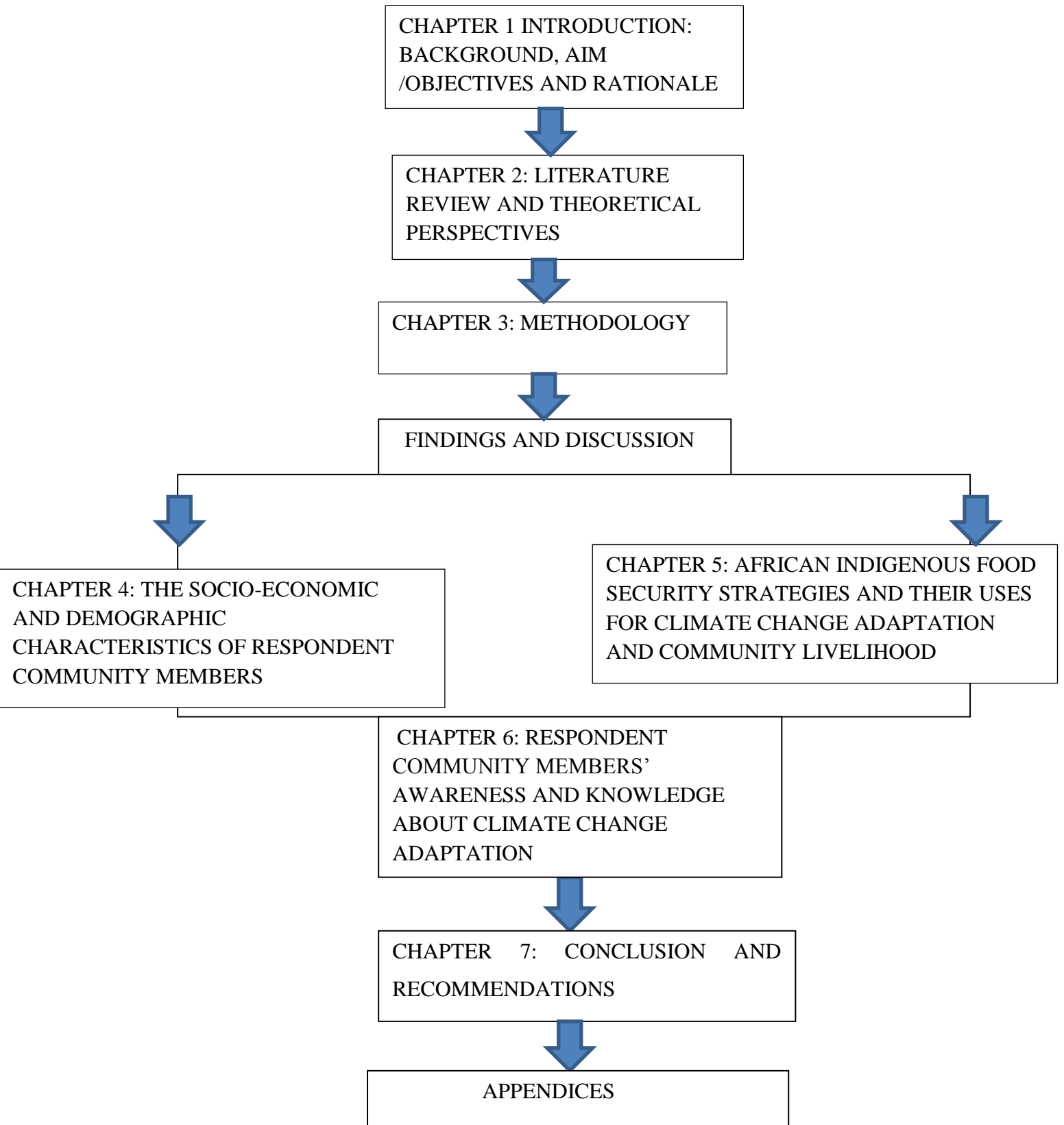


Figure 1.5. Organisation of the Study

CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL PERSPECTIVES

This Chapter explores the existing literature addressing the key debates and trends in Indigenous knowledge systems as related to indigenous food security strategies for climate change adaptation. A review of literature on the debate relating to the concept of indigenous knowledge in relation to other knowledge systems, especially dominant western knowledge systems, shows that the debate is very contentious. Therefore, this Chapter will start by locating the concept of knowledge within the context of indigenous knowledge systems by providing a brief outline of the contentions between western and non-western scholars.

2.1. Knowledge within the Context of Knowledge Systems

A review of related literature indicates the tension which exists in the western scholars' acknowledgment of indigenous knowledge as knowledge in its own right. It is on the basis of this aspect that western knowledge systems as dominant systems of knowing and knowledge production have tended to marginalize indigenous knowledge systems. This has always created a challenge in the effort to interface the two divergent systems of knowing. Therefore any effort to integrate the two systems should begin with an examination of what knowledge is all about in order to facilitate a processing of generating a knowledge system which will encompass both systems for sustainable livelihood.

Wayne (2000) shows that the concept of knowledge has various faces, some of which are religious as they tend to embrace spirituality – which has been separated from knowledge in the mainstream debates. This is elaborated by Gyekye (2011) who indicates that while millions of human beings regard knowledge of the spirit world as the lynchpin of their whole orientation in this world, spirituality is increasingly being neglected in the education and lives of the younger generations. It has been argued that the marginalization of spirituality as part of knowledge is a major factor in the moral degeneration that has engulfed the modern world (Ellis, 2012). For some western scholars knowledge is attributable essentially to the individual. Davenport and Prusak (1998) look at knowledge as a fluid mix of framed experience, contextual information, value and expert insight that provides a framework for assessing and integrating new skills and information.

This framework regards knowledge constructed by any individual as valid knowledge. This view implies that everyone is essentially a knowledge producer without looking at its social and cultural context. Dewey (2008) emphasizes the changing character of knowledge; knowledge continues to change as new relationships are created with every new situation that presents itself. Dewey (2008) further elaborates on the power and the interconnected character of knowledge. According to him, knowledge as power has allowed those with the knowledge, or with the power, to decide what knowledge should be in the public domain and how it can be utilized, to dominate others.

The domination of individuals, social groups and nations over others has not always been based on brute force but rather on the knowledge at their disposal and on the innovation and creativity they bring to bear in using their knowledge. On the issue of interconnections, he argues that, ideally, perfect knowledge is knowledge that presents a network of interconnections where all experiences are valued and seen as contributing to knowledge already accumulated in order to solve problems in new contexts in the future. This knowledge is accordingly acquired through experience, study and what others have ascertained and recorded (Dewey 2008). However, Allen (2014) adds that knowledge does not in itself have power; rather power is generated as a consequence of knowledge. For instance, western scientific knowledge, as knowledge that is currently dominant, has power.

2.1.1. Institutionalized Knowledge and Power

Van Dijk (2003) shows that knowledge is institutionalized when it is directed and controlled by the dominant group/s in society. This gives the dominant group/s the power to decide what knowledge should be in the public space and what knowledge should not be in the public space. This implies that the majority of the people who are not part of the dominant group are simply controlled through the knowledge they are allowed to access and the knowledge they are not allowed to have access to. For instance, under colonialism and the apartheid system in South Africa the different racial groups remained separate. This was a result of the knowledge they held that made them believe in the notion that they belonged to different “races” and were therefore different. The laws promulgated under this perspective made South Africa thrive as an apartheid state owing to the ignorance allowed by the state. The state intervention in allocating people of different social groupings different resources and opportunities cemented the belief in the superiority of white people in the country.

2.1.2. Knowledge as a Commodity

Jessop (2007) illustrates the way knowledge has been used as a commodity, under capitalist relations by indicating that the innovations and technologies protected under intellectual property rights have afforded those with particular knowledge a monopoly on inventions and business. This contention is elaborated by Lankshear et al. (2000) who questions that if knowledge is tied to intellectual property rights, one interrogates what the value of the knowledge transmitted in curricula in our schools is. The acquisition of this knowledge at the various formal educational levels including higher education has become a commercial undertaking as formal education is becoming unaffordable to many people. Choo (2002) states that what was traditionally a conversation between people exchanging information in formal settings has become commercialized to the point where those who do not have the means to acquire information are likely to remain outside the knowledge system. Marginson (2004) adds that institutions of higher learning are becoming more and more expensive, hence running the risk of reproducing social hierarchies, because only those with money will be capable to afford the formal education, especially higher education.

2.1.3. Knowledge within the Context of Indigenous Knowledge and Education

Odora Hoppers and Makhale-Mahlangu (1998, in Odora Hoppers 2002) look at knowledge within the context of indigenous knowledge systems as being a combination that includes technology, social, economic and philosophical learning, and systems of education, law and governance. It is knowledge relating to technological, social, institutional, scientific and developmental experiences, together with experiences deriving from the liberation struggles (Odora-Hoppers & Makhale-Mahlangu, 1998).

Serote (1998) adds that indigenous knowledge systems involve human experiences that are organized, ordered and accumulated as knowledge that can be used to achieve quality of life and to create a liveable environment for both human and other forms of life. This conceptualization of IKS includes all forms of knowledge technologies, know-how, skills, practices and beliefs that allow the community to attain steady livelihoods in their setting. Nakashima et al. (2000) make the point that IKS, sometimes known as indigenous sciences, present themselves holistically as knowledge deeply tied to the earth and everything in it.

They are forms of knowledge systems that value all human experiences. This knowledge is generally held by indigenous people and transmitted mainly orally.

Wendy (2006) defines Native science as:

A celebration of renewal, where the ultimate aim of the knowledge is not to explain and objectify the universe, but it is rather learning about and understanding responsibilities and relationships and celebrating those that humans establish with the world.

Peat (1994) elaborates that IK, unlike modern science, is not compartmentalized and neither is it reductionist. There is a seamless transition between the material and the spiritual and between all things living and non-living. In IKS such boundaries are permeable (Castellano, 2000). It is on the basis of this consideration that the conceptualization of indigenous knowledge as “holistic” means that all scenes, coupled with openness or intuitive or spiritual insights, form part of the knowledge. In western or modern science perspectives these aspects tend to be neglected as un-scientific.

Du Toit (2005) adds that indigenous science observes the subtleties of nature as part of the knowledge system and that these subtleties are not used to control nature but rather to help the observer to be in harmony with nature. This education, passed on for free in indigenous communities throughout a person’s life cycle, is valuable for survival and sustainability. Nakashima & Roué (2002) indicate that knowledge within the context of indigenous communities includes not just knowledge in its own right but also ways of using knowledge. It is not enough to know the properties of a plant, for instance; knowledge of how to prepare the plant for use is equally vital. According to Castestello (2000) the knowledge value in indigenous societies is derived from multiple sources which include traditional teachings, from previous generations, through various cycles, including story telling; empirical sources of knowledge gained through careful observation of ecosystems by many people through the generations; and dreams, visions and institutions revealed to the people and understood by them to be spiritual in origin.

Battiste (2002) demonstrates that over the millennia, indigenous peoples all over the world, including those in Africa, have had their own unique ways and perspectives of conceptualizing and relating to the world, the universe, and each other. Their traditional educational processes were carefully crafted around observations of natural processes. They

developed their unique modes of understanding, adapting and sustainably using their specific physical environment and establishing a supply of sustenance from the plant and animal world by using natural materials to make their tools and implements. These indigenous ways of knowing, knowledge production and their value systems which were transmitted orally and through social practice from one generation to the other were marginalized by western institutionalized structures of education through colonialism, apartheid and other forms of imperialism (Barnhardt & Kawagley, 2005).

According to Odora-Hoppers (2002), 70% of African people live in rural areas and use this rural basis of livelihood and existence in contributing to development and subsidization of the state in areas where a community's resourcefulness can overcome their difficulties. This is elaborated by Dei, Hall & Rosenberg (2000) who state that their indigenous knowledge about the natural world included knowledge of the fauna and flora in their environment, and their own version of meteorology, physics, chemistry, pharmacology, psychology and the many other skills that are necessary for everyday existence. The adoption of laws governing indigenous communities is a collective rather than an individual matter for communities (Seymour, 2004). Knowledge of the social sciences such as politics, governance, economics, sociology, and ethnology and humanities, i.e. communication, arts and crafts also formed part of the knowledge basis of these indigenous communities (Champagne, 2007).

This symbiotic and holistic nature of knowledge and education in indigenous communities is explained by Banda (2008) who sees education as the influence exercised by adult generations on their young in order to stimulate and develop them physically, intellectually and morally, as demanded by both political society as a whole and the particular milieu for which a young person is specifically destined.

Therefore, the kind of knowledge and education transmitted to younger generations determines the values they eventually uphold and these are usually reflected in the kind of communities they build. For instance, the dominant knowledge and education we have in South Africa, and in other African countries which were colonized, have been conceptualized and constructed without the participation of African indigenous people themselves. As a result the colonized people have been removed from their indigenous learning structures while simultaneously being drawn towards the structures of the colonizers (Mart, 2011).

The following sections discuss Indigenous Knowledge Systems within the context of food security and climate change adaptation.

2.2. Food Security and Climate Change Adaptation within the Context of African Indigenous Knowledge Systems

On the basis of the discussion about knowledge, education and indigenous knowledge systems, Ajani et al. (2013) state that African indigenous small-scale farmers, especially women, have over centuries of social practice, developed local strategies of adaptation to climate change.

Lim (2005) defines climate change adaptation as:

Involve processes and strategies of moderating and coping with the consequences of changing climatic conditions.

Examples of climate change adaptation strategies used by African subsistence farmers include early warning systems and long term experience in coping with climatic variability. The early warning systems, involve the knowledge of behaviours of living organisms (animals, insects, plants, etc.) as indicators of climate change; the monitoring of short term weather cycles, as well as long term experiences with climatic variability and the appropriate livestock breeds, plant varieties, and resource management practices, such as mixed cropping practices. The latter involves the cultivation of different types of crops such as root crops (sweet potatoes) on the same land. The crops are harvested at different periods of the year, ensuring household and community food security (Agrawal, 2003; and Berkes, 1999).

Elliott et al. (2012) explain that, from a community perspective, indigenous food systems include all types of food that are available to a specific cultural group from its local natural resources and the customary forms for their use within that culture. This includes the socio-cultural meanings of these foods, their acquisition, processing, and use within that culture. Morrison and Ostry (2008) have the view that, in spite of modern technological systems introduced by western cultures and knowledge systems for food security in Africa, most people, especially in the remote rural areas, still depend on their local community knowledge and technology systems including cultural values for food security and to adapt to changing climatic conditions. They strive to pass down this knowledge to younger generations for sustainability, increasing food security, and self-adequacy within their communities.

In spite of the fact that sustainable food security has been the concern of most developing countries including South Africa, the policy strategies to ensure the envisaged food security

by increasing agricultural productivity have not been sustainable. They relied on capital intensive technologies which are not affordable to poor, small scale farmers, especially women. They marginalized local knowledge systems including experiences. Furthermore, the use of chemicals as fertilizers or pesticides had a negative impact on the environment as they polluted the water and soil resulting in health hazards for the people and local communities in general (Brown, 2004). The poor health situation of the farmers also affected food security as they were unable to increase agricultural production.

This is based on the argument that the introduction of modern, especially large scale farming in South Africa, might have had great successes in certain areas of the country and the North-West Province, but a large proportion of people, especially in the rural areas such as Ganyesa are experiencing food insecurity as subsistence farmers due to vulnerability to climatic changes (A Re Ageng, 2001). These subsistence farmers, mostly women, still depend on their indigenous agricultural knowledge and technology systems for food security and climate change adaptation. Ndangwa (2007) supports the notion that Indigenous knowledge can be a significant sustainable development source for countries that are overly reliant on western knowledge and technology systems.

The study has the opinion that despite the fact that these community-based knowledge and value systems contribute to household and community food security while conserving the environment under changing climatic change, they have not been adequately documented through research to inform policy and to be shared with the younger generation especially the knowledge held by women.

2.2.1. Women and Food Security in Climate Change Adaptation

A review of related literature and my personal experience indicates that the indigenous knowledge a person possesses is a function of factors such as age, gender, marital status experience, etc. (Mundy and Compton, 1995; Haverkort, 1995). For instance, in most African communities IK is held by elderly people due to long life experience; certain knowledge such as midwifery, cooking, indigenous food plants and other resources, food processing, is held by women as the ones who are most directly involved.

In the context of this study the role of women in food security and climate change adaptation cannot be underestimated. In fact, in most areas of South Africa women are the major

subsistence farmers providing the basis of household and community sustainable livelihood. The majority of them depend on their local community- based agricultural knowledge and innovation systems for agricultural production. Overtime they have learnt to cope with changing climatic conditions and their coping strategies have been enabled via indigenous knowledge practices. Statistics South Africa (2012) shows that women constitute over 50% of the population in agriculture for food security at both household and community level. Their roles and potential contribution to food security put them at the centre of indigenous, controllable, cost effective, sustainable development and livelihood.

The Food Agricultural Organization (FAO) (2009) reveals the role of African women in household and community food security as being multidimensional. They preserve the community biodiversity due to their wide specialized knowledge of traditional plant and animal species. Other important components of their contribution to food security and climate change adaptation incorporate the use of integrated pest management established upon community based knowledge (Sherwood& Bentley, 2009).

Carr (2006) notes that to have a comprehensive understanding of the indigenous food security strategies especially those held by women is to take into consideration the community's social experiences and perceptions not only the biophysical and economic conditions. This was based on the argument that the current focus on community social experiences and perceptions has not yet resulted in social thought discourses about food security and climate change adaptation.

Saito et al. (1994) indicate that women constitute the majority of small-scale farmers, providing most of the labour and managing a large part of the farming activities on a daily basis. Traditionally, the roles of men and women in food security and climate change adaptation differ. The World Bank (1989) in Reshid (2004) states that African women perform about 90% of the work of processing food crops and providing household water and fuel wood, 80% of the work of storage and transport from farm to village, 90% of the work of hoeing and weeding, and 60% of the work of harvesting and marketing.

2.2.2. Indigenous Knowledge Systems (IKS) and Climate Change Adaptation

Indigenous knowledge provides principled understanding to local members in which decision making is locally based in the way that allows every person to act with these rules to maintain

security. In the view of dynamic world, these rules provide people with a sense of community belonging and stability. Ajani et al. (2013) state that indigenous knowledge is gradually showing a similarity with scientific systems as many concepts in indigenous knowledge that were once considered as native and unwise, are now seen as suitable and refined. Critical attention to the subject of climate change has been crucial in identifying modes of adaptations and attempts at engaging indigenous knowledge. The attempts to engage Indigenous knowledge (IK) draw attention to the extent that IK has a great influence in local communities which can enable understanding and active interaction and improve the level of dissemination and use of climate change adaptation options.

Considering different cases of small scale farmers that are better able to approve new perceptions when these can be perceived in the perspective of present indigenous practices. For instance, a study in Zimbabwe observed that farmers' preparedness to use seasonal climate predictions improved when the predictions were offered in combination with and compared with the local indigenous climate predictions (Patt and Gwata, 2002). This could have provided an indigenous theoretical outline for developing methods and approaches of integrating indigenous ways of knowing and knowledge utilization into climate change policy.

With the increasing intensity of climate variability and floods observed throughout Sub-Saharan Africa particularly in recent years, it is predicted that these effects of climate change will continue to have a negative impact on small scale agriculture across the continent (Easterling et al, 2007). Much empirical evidence, however, suggests that adapting to climatic effects are not entirely beyond local farmers' control (Nyong and Osman, 2007; Moretimore and Adams, 2001). These scholars see farmers in the agriculture sector as innovators with a sophisticated body of indigenous knowledge systems comprised of practices gained through experience and transmitted through members of a community (Agrawal, 2003).

Many African communities, especially women as small scale farmers, have used indigenous knowledge (IK) as a significant knowledge base and survival tool under changing climatic conditions and other natural hazards. The International Indigenous Peoples' Forum on Climate Change (2009) states that for generations, indigenous peoples in different parts of the world including South Africa have managed environments protecting their connection in sustainable and culturally different ways. Indigenous knowledge, initiatives and coping strategies and approaches express local adaptive management to the changing environmental

conditions, and complement scientific research, observations and monitoring. Local communities through experiences and observations have known patterns of weather; how and when local natural disasters occurred; how to plan to adapt with their effects on the natural environment, livelihoods, and lives.

There is in fact a large body of literature that documents how small scale farmers use indigenous knowledge systems to adapt to climatic trends in Africa (Newsham, 2011). For instance, the Nganyi community of western Kenya uses indigenous approaches of weather predicting such as the behaviour of ants, bird songs and timing of tree flowering to decide when to prepare lands and sow seeds (Guthiga and Newsham, 2011). This reflects the prosperity of indigenous knowledge that small scale farmers possess based on local experiences and observations.

Furthermore, climate change cannot be separated from sustainable development as it has negative effects on development in terms of floods and droughts (Swart et al. 2003). Adaptation strategies for climate change are those methods that enable the individual or the community to adapt to the effects of the changing climatic conditions or natural disasters. Such approaches within the context of IK for small scale farmers incorporate the adoption of effective environmental resource management systems such as the planting of early maturing crops, adoption of hardy selections of crops and selective keeping of livestock. Interfacing indigenous knowledge systems into climate change strategies can lead to the development of effective approaches and methods that are cost-effective, participatory and sustainable (Robinson and Herbert, 2001).

CHAPTER THREE

METHODOLOGY

3.1 Research Design

This study followed a participatory and case study approach to examine the efficacy of African indigenous food security strategies and climate change adaptation in Ganyesa village in the North West province (South Africa). Kemmis and McTaggart (2005) define a participatory approach as a methodology that argues in favour of the possibility, the significance, and the usefulness of integrating research partners in the knowledge-production process. In this study the participatory approach provided the study community (indigenous knowledge holders or practitioners, village elders, and other knowledge holders) with the opportunity to be participants in the research process, including identification and selection of the study case, data analysis and interpretation from their own cultural perspective.

The participatory approach is meant to fill the power gap between the researcher and the researched because the respondent community members were involved in the planning and defining of the research problem and study process. This created a collegial relationship between respondent community members and the researcher. The socio-economic and demographic characteristics of the key informants were studied and interpreted from their own perspective.

The case study approach and method was also employed in this study in order to have a comprehensive understanding of the research problem from the perspective of the community members. Babbie (2007) looks at the case study method as a study approach that involves a practical examination of a problem within its actual framework. It provides a methodical and comprehensive approach of observing an event or situation, gathering information, analysing data and recording the outcomes. As a result, the researcher gains an in-depth understanding of why the research issues occurred as they did, and what might become a significant issue to consider in the future (Bless et al, 2006).

However, the researcher would like to indicate that there is a clear distinction between case study and qualitative research as it can involve a mix of qualitative and quantitative evidence. Eisenhardt (1989) indicates that the case study method is used to develop and produce new

theories, to challenge theory, to explain a situation, to explore or to describe a phenomenon by scholars from various backgrounds. In the context of this study, the case study method was used because of its relevance to actual life situations, present human conditions and its easy accessibility through written reports.

Therefore, taking into consideration the holistic nature of Indigenous Knowledge Systems, both quantitative and qualitative methods of data collection were used in order to have an in-depth understanding of the study problem. In this study, qualitative research was used to gain understanding of the respondent community member's attitudes, behaviours, value systems, concerns, aspirations, culture and or lifestyles concerning the research problem. Quantitative research was used to collect the socio-economic and demographic characteristics of the respondent community members.

According to Denzin and Lincoln (2005:3), qualitative research examines the issues in their usual surroundings and tries to make sense of, or understand occurrences in relation to the interpretations people bring to them. The qualitative method explores the why and how of conclusions, and not merely what, where and when. Given (2008) defines the quantitative method as a methodical practical study of social phenomena based on statistical, mathematical or computational methods.

3.2 Study Site

Ganyesa village in the North West province, South Africa, formed the unit of the study. The Batswana ethnic group are located here living in the Kagisano Molopo Local Municipality of North West Province (South Africa). This tribal group was chosen for the study because they are known in the province for using African indigenous food security strategies in determining agricultural seasons, tracking time and natural disasters. Moreover, the researcher originates from the area and knows the local culture and language of the study community. This made it easier to have access to the sources of information.

3.3. The Study Sample and Selection Procedure

The researcher interacted with community indigenous knowledge holders or practitioners, village elders, and other knowledge holders in the study community for the purpose of

sampling. In collaboration with the community leaders, a purposive sample of 40 Indigenous knowledge holders and practitioners (25 Female and 15 males) were selected for the study. Babbie (2001) defines a purposive sample as a sample selected in a deliberate and non-random way to reach a particular aim. Both gender sections of the community were involved in order to give them an opportunity to be involved in the study. Emphasis was placed on women participants because they play a primary role in ensuring food security for households and the community at large

3.4. Data Collection Process

Taking into consideration the holistic and community-based nature of indigenous food security strategies for climate change adaptation, a combination of both qualitative and quantitative data collection methods were used in order to cross-reference the different sources and methods of data collection. These included in-depth interviews, focus group discussions, participant observations, and a questionnaire for demographic information of the respondents and examination of secondary sources, especially past research studies and other relevant secondary sources.

The interview guide contained both unstructured and structured questions to permit an open and free flow of ideas from respondent community members. However the researcher was aware of the possible flaws in interviewing as a method of ascertaining the truth as the knowledge gained is limited by what the participant chooses to tell or not to tell at that specific time. The limits of the interview method were thus fully considered and respected.

To evade any awkwardness for the respondent the researcher chose not to ask personal questions such as childhood experiences, income and religious affiliations. Interviews alone were considered inadequate for this study, hence were enhanced by the use of participant observation to improve the validity of the results.

One of the advantages of using participant observation is that it enables the researcher to take into consideration the use of non-verbal expressions such as the emotional state of the respondents, to know how the relationship among the respondent community members is as well as their communication with each other and how much time they spend with each other doing different activities together. Participant observation is used in qualitative research by

various disciplines as a way of gathering information about or in order to know about different cultures, people, and procedures (DeWalt and DeWalt, 2002).

Through the assistance and cooperation of the community leaders and IK practitioners the researcher participated in various food securities related activities in the farms including community meetings on agricultural issue. The researcher was aware of the challenge facing the use of the participant observation method because, the researcher pays more attention to those who are identified as being more knowledgeable on the research topic and this causes the researcher not to pay much attention to what happens out of the public eye. Another problem to contend with is the fact that at times researchers are not welcome in some communities where they see the need to conduct their research, mainly because of their age, how they dress, the ethnic group they belong to, class, and gender.

One of the challenges associated with participant observation is the fact that the researcher has to learn and engage with an unknown culture while learning how other people live in their communities. The researchers learn all this while living as full time community members of that particular community for the whole duration of the research. This is a challenge as researchers now have to live and behave differently as they normally do, just so that they fit into the community's way of living or doing things. On the contrary, this did not occur in this research as the researcher comes from the area of study, and knew all the community's ways of living and culture. Hence, the researcher did not have to worry about the community's culture.

The focus group discussion method was used to ensure that all viewpoints were adequately represented. The researcher also made sure that community members, especially women who had the best knowledge and experience of the area, were included in the discussion. Focus group discussions were conducted with randomly selected groups of 6-10 community members. Marshall and Rossman (1999) state that the focus group discussion method can be seen as a form of group in-depth interview; the difference lies in the fact that it is a group rather than one-to-one interview. Also, by getting the participants to discuss among themselves, it is a faster and easier way of collecting qualitative data in less time than would be needed for individual interviews.

One limitation, however, levelled against focus group discussion is that the focus groups are placed in an artificial environment which can influence the responses that are generated. This

is due to the fact that scholars using the ethnographic method will place themselves in the real environment which is unreachable for focus groups. The fact that in focus group discussions people are grouped in a particular room implies that they might act different from how they act when they are not observed and it might affect the quality of research outcomes.

The overall objective of using a variety of data collection methods was to explore people's knowledge and experience relating to the research problem. The various data collection tools were used to triangulate each other. Triangulation refers to the use of more than one approach to the investigation of a research question in order to enhance confidence in the ensuing findings (Bryman, 2004). In this study triangulation ensured trustworthiness, validity and reliability of the data. On the issue of informed consent, the researcher required permission from the respondents to record their interviews, instead of having to write the responses down, which would have been time consuming for both the respondents and the researcher. This helped the researcher to pay attention to the responses and the people being interviewed.

Each consent form signed by the respondents contained interview questions that the respondents would be responding to. In order to protect their identity, the researcher ensured that the names of the people interviewed were not mentioned through the use of pseudo names instead of genuine names when discussing their experiences throughout the study. Participants were also given the choice to discontinue participating whenever they felt that they had lost interest in the study.

Sarantakos (1998) states that data analysis involves making sense out of the information gathered from research and to bring out meaning from data. Qualitative data in the form of digital voice recorded interviews were transcribed and translated from the local language "Setswana" into English. Interview and participant observation notes were typed and analysed using content analysis.

Weber, (1990:12) explains that content analysis is a methodical technique for analysing word-based data in a standardised way that permits evaluators to make suggestions or conclusions about that information. Classifying numerous texts and words in much fewer content categories is a significant idea in content analysis.

The Quantitative data from the questionnaires was checked and coded. Vestra (2003) defines quantitative data as information based on numbers or statistics that describes activities, populations and so on. In this study, quantitative data from the questionnaires were checked,

coded and analysed. Validation checks were implemented through all stages of the study to ensure the utmost level of data accuracy. Issues and concepts which were vague or omitted were clarified or collected by returning to the respondents, community members for review.

3.5 Ethical Considerations

In this study the researcher adhered to ethical considerations prescribed by the University of KwaZulu-Natal ethical research guidelines for conducting research in local communities. An Introductory letter specifying the purpose of the investigation and the kind of assistance requested from the community members was written to the study community leader before data collection started. The researcher assured the participants that their information would be kept confidential. The integrity and anonymity of the participants was respected. Furthermore, the researcher also avoided plagiarism by acknowledging all primary and secondary sources used in this study. Participation in this study was strictly voluntary.

3.6. Limitations of the Study

The methodology used in this study might have left out some informants with rich knowledge on the research problem. For instance, the purposive sampling model used concentrated on community members from the age of twenty five (25) to eighty (80). It might therefore have left out some younger members with valuable information on the research problem. Moreover, the data collection process in general had a few challenges, such as difficulties in meeting the respondent community members and members postponing appointments leading to the need to reschedule. However, the majority of the respondent community members showed interest and participated well in the study.

CHAPTER FOUR

THE SOCIO-ECONOMIC AND DEMOGRAPHIC CHARACTERISTICS OF RESPONDENT COMMUNITY MEMBERS: COMMUNITY PERSPECTIVES

There has always been a concern from local community members including those in the study community that most of the studies conducted by researchers from outside these communities tend to conceptualize the socio-economic and demographic characteristics of the communities such as age group, marital status, educational levels and religious affiliation from a western perspective. They overlook the cultural meanings which the people themselves attach to these variables with regard to the various sustainable livelihood challenges facing the communities such as food security and climate change.

It is on the basis of these concerns that the study first examined the socio-economic and demographic characteristics of the local communities such as age group, marital status, educational levels and religious affiliation from the perspectives of the respondent community members themselves. These perspectives are expressed below in the form of narratives with regard to the meaning and significance of the socio-economic and demographic characteristics in relation to the research problem, i.e. indigenous food security systems and climate change among the Barolong Borra Tlou le Tau. This is the dominant Tswana ethnic group in the Ganyesa area, where the study was conducted. The common language is Setswana.

4.1. The Traditional Significance of Age Group

The study revealed that among the Barolong Borra Tlou le Tau, age was a significant factor in the cultural and socio-economic life of the people including matters of household and community food security. Rre Maabi (a community elder) explains in Setswana, the local language of the community:

Go ya ka Barolong Borra Tlou le Tau, mosimane kgotsa mosetsana yo o fetileng dingwaga tse tlhano o setse a le mo lelokong la go ka tsaya karolo mo ditirong tsa temo le tse dingwe tsa go netefatsa dijo mo lelapeng le mo

motseng. Sekai, ke ne ke tlwaetse go tsoga phakela ka ura
ya botlhano go tsaya dintswa go ya go tsoma le bo aubuti.

Rre Maabi states the importance of age group distribution with regard to social/community and household division of labour for food security. According to the Barolong Borra Tlou le Tau, a boy or girl who is above five years old was already in the age group of participating in the farming and other food security activities of the household and community. He gave an example of himself: that he used to wake up at five o'clock and take dogs to hunt with his older brothers.

Rre Dioka (community knowledge holder and practitioner) provided his own experience on the issue that:

Ka ke ne ke sa le mosimane ke le dingwaga tse lesome le
botlhano (15) basime ba dingwaga tsa me ba ne ba
tsosiwa ke bo rra bona mo mesong ka ura ya bone go ya
go batla dikgomo gore di gamiwe. Jaaka basimane re ne
re setse re tlwaetse go tsoga phakela pele bo rra rona ba
tsoga thata ka nako ya temo. Re ne re tsoga mo mesong
go rulaganya dikgomo tsa temo le peo ee tlang go
dirisiwa. Ene ere fa bo rra rona ba tsoga ba fitlhele
sengwe le sengwe se baakantswe mme re ne re rulaganya
bontsi jwa dilo tse ditlhokagalang letsatsi pele ga temo.
Ka ke ne ke sa le mosimane ene e re re fitlha ko tshimong
ke tla be ke goga dikgomo ko pele, rre a lema mme
aubuti wa me wa dingwaga tse somepedi tlhano (25) abo
kgweetsa dikgomo.

Rre Dioka indicated that when he was still a boy aged fifteen years (15) together with the boys of the same age group, they would be awoken by their fathers at four o'clock in the morning to look for cows to be milked. During the planting season, they woke up early before their parents to prepare the span of oxen and seeds for planting. When the parents woke up, everything would be ready for the farming activities of the day. He further narrated that at the field he would hold the cord ahead of the bulls; his father would till and the elder brother aged twenty five (25) would drive the oxen.

On the issue of climate change in relation to farming activities as the main occupation of the people in the community, the community knowledge holder Rre Kgaole explains:

Go tsaya karolo mo meetlong ya setso go ya ka dingwaga tse di itseng. Sekai, ngaka ee maroka e tshwanetse abe ale mo dingwageng tse somepedi tlhano go ya go someamabedi tlhano (25-45) e bile ana le maitemogelo mo go tlhapiseng pula. Go ne go dumelwa gore ka dingwaga tsena o setse o nyetse, o na le maikarabelo ebile o tutugile go ka bua le badimo.

According to Rre Kgaole certain cultural professions related to rain-making including participation in their rituals depended on one’s age group. For instance, in rain making rituals one must be above twenty five years of age (25-45) to participate in these related rain-making cleansing ceremonies. It was believed that at this age group one was already married, responsible and ready to communicate with the ancestors.

The above narratives from the community members demonstrate the cultural importance of age group in the food security of the study community which tends to be neglected by western research approaches. Table 4.1 shows the percentage age distribution of the respondent community members.

Table 4.1 Percentage Age Group Distribution of the Respondent Community Members

Total number of respondents (Male = 15; Female = 25)

Age Group	Male	Female
20-30	7	8
31-40	13	4
41-50	20	20
51-60	33	36
61 and above	27	32
Total	100	100

Table 4.1 shows that the majority of the respondents (83% males and 92% females) were in the age group of 31 years and above. During in-depth interviews there were a significant

number of both mature and older representatives (51 to over 60), this group of participants carried knowledge and experience of previous decades. Therefore the younger generation and older generation mix provided the study with more insight.

4. 2 The Role of Gender among the Barolong Borra Tlou le Tau

In the context of this study gender is defined in terms of the socio-cultural relations between men and women in the society (Butler and Robinson 2001). Among the Barolong Borra Tlou le Tau in Ganyesa gender plays a very crucial role in matters pertaining to food security. The study revealed that women were responsible for most of the household and even community aspects related to food security.

Mme Boikanyo (community knowledge holder) explains in Setswana:

Go ya ka setso sa Batswana ba Ganyesa borre ba tthagolela lefelo la temo fela ba be ba tlogelela bomme go dira tiro yotlhe ya temo. Jaaka go tthagoleleng dijalo gore di se hupediwe ke mohero , go hola dijo, go tswelletsa le go boloka. Mme le fa gontse jalo, bomme le borre ba ne ba dirisana mmogo mo go baakanyetseng temo, go tlhopa dipeo le go lema. Bomme ba ne ba na le maikarabelo a go netefatsa gore dijo diteng, go ga metsi le go rwalela. Bomme ba na le maikarabelo a go tlhokomela ko lelapeng mo go dimo ga tiro ya bona ya ko masimo. Borre bo ntsi jwa nako ba mo temong ya go rekisa fa bomme ba tlhokomela dijalo tsa gore di ka jewa mo lelapeng.

According to Mme Boikanyo, traditionally among the Batswana of Ganyesa men cleared the land and left women to undertake the remaining farming activities, such as weeding, harvesting food, processing and storage. However, men and women worked together in land preparation, sowing and planting. Women were also responsible for food preparation, fetching water and gathering firewood. She further explains that women also bear the responsibility for the household chores in addition to their agricultural tasks. Men are

primarily involved in the production of cash crops, whereas women take care of the crops for household consumption.

For instance, direct observation showed that, during summer rains wild indigenous vegetables such as amaranthus were only collected by women. Women stored the vegetables in bags and processed by sun drying to be used in winter when they were not available. These indigenous vegetables if stored properly can last up to three years. The researcher who originates from the area has over years observed and experienced the wide knowledge on issues of food security related to climate change adaptation. Table 4.2 shows the percentage gender distribution of the respondent community members.

Table 4.2 Percentage Gender Distribution of the Community Knowledge Holders and Practitioners

Total number of respondents (Male = 15; Female = 25)

Gender distribution	Percentage
Male	38
Female	62
Total	100

Table 4.2 shows the percentage gender distribution of the respondent indigenous knowledge holders and practitioners. The majority of the respondents (62%) were female. In-depth interviews and focus group discussions showed that the respondent women knowledge holders and practitioners had a wide knowledge on indigenous food security strategies and climate change adaptation in the community. They demonstrated knowledge and experience of ensuring food security and coping with climatic changes because they were directly involved in these activities for survival.

Indigenous knowledge practitioner Rre Makoi indicates that:

Go tloga bogologolo tala, go ya ka setso sa Batswana ba Ganyesa moroka go tshwanetse e nne batho ba borre mme e seng bomme ka ntlha ya fa bomme mo botshelong jwa bona go na le dinako tse ba sa itshekang mo go tsona fa ya bo e le nako ya go tlhatswa mme e sa ba letle go

kgoma kana gona go dirisa ditlhare tsa setso. Go ne go kaega gore ba ka tloga ba di fifatsa ka ntlha ya fa ba tla di kgotlhela fa ba ne ba ka di kgoma kana gona go di ama fela ka mokgwa mongwe fa ba santse ba le mo maemong a a ntseng jalo. Ntle le jalo, jaaka ele tiro ya bona golema go netefatsa fa dijo di nna di le teng, bomme la basetsana ba ne ba diragatsa dikoma tsa pula tse di nang le karolo e kgolo thata fa go rapelelwa pula.

According to Rre Makoi from a long time ago, among the Batswana tradition of Ganyesa rainmakers were supposed to be men only. Women were not allowed to play a role because of the fact that there are certain periods in their lives when they become impure due to menstruation. During these times, according to tradition they were not allowed to engage in traditional medicine and healing practices. It was believed that they would make the medicine useless and impure. However, being the main activators of the land for food security, women and girls performed rain songs which constituted a vital part of the prayers for rain.

In-depth interviews with both female and male knowledge holders showed that although Batswana women were traditionally not allowed to be rainmakers they nevertheless played a critical role in the performing of the rain-making ritual. They were expected to prepare the rain songs and perform during the rain-making rituals.

Focus group discussions revealed that women possessed a detailed awareness of the species and ecosystems which surround them for climate change adaptation. They were often the local educators, passing on traditional knowledge and technologies to younger generations, both girls and boys.

The study has the opinion that an understanding of the role of gender and the way it impacts on the essential values of community -based knowledge systems among the Batswana of Ganyesa village is significant to the understanding, interpretation and dissemination of their indigenous knowledge systems. Pidatala et al, (2003) indicate that, due to gender differentiation and specialization in African local communities, the community knowledge based skills held by women, vary from those held by men, affecting the means of access, utilization and management, while resulting in various views and significances for the advancement and utilization of IK.

The study also observed that women's role in indigenous food security and climate change adaptation in the study area was more multidimensional. They preserved the community biodiversity due to their wide specialized knowledge of traditional plant and animal species found in the community. Ganyesa is a semi-arid area where a cattle farming is an important aspect of local agriculture. Batswana women played a significant role in the utilization of IK related to cattle as they were the ones who mostly collected fodder for cattle, milked and used cow dung for various purposes including as an energy source. Women also played a major part in post-harvest processing of vegetables and grains including storage.

During focus group discussions it was reiterated that women were predominantly responsible for processing animal products- another area of indigenous expertise. Where women were involved in milk processing and marketing, they had a thorough knowledge of the fermentation process, including the effects of temperature and acidity. They were also quite knowledgeable about dairy hygiene because they washed and sun-dried the utensils they used and the containers in which milk were stored.

During focus group discussion and direct observation it was revealed that the number of female-headed households was increasing as most men migrate due to the lack of employment and other income-generating opportunities. This explained why most women had food plots of early maturing short season crops for survival. These food plots were considered women's plots because they performed all the tasks on their plots from planting to harvesting. In some instances men assisted women to clear the plot for planting but this is not common. An example of such crops was spinach as it can be harvested in less than two months. Exotic plants such as onions, carrots, and cabbage were also cultivated because they could be grown during mild temperatures.

The above findings of this study are in agreement with The Food and Agriculture Organization (FAO), 2002) which observed that men are migrating from rural areas to cities in search of paid employment thereby leaving their families to be headed by women. This has resulted in women taking more responsibilities in agriculture in order to face an increase in family responsibilities including food security in changing climatic conditions.

For example, indigenous knowledge holder Mme Legau planted tomatoes, watermelon and pumpkins because they did not take long to mature. They took three to four months to be ready for harvest and need warmer temperatures to grow. (Mme Legau indicated that during winter and summer had something to plant for a living she does not just depend on the rain or

normal cultivation season. In addition, many of saved seeds from previous harvest can withstand drought better than new seeds and from them they can have good yield. The saved seeds mature fast which helped them during food shortage seasons).

4. 3. Marital Status and Indigenous Food Security for Climate Change Adaptation

During the in-depth interviews and focus group discussions on the role of marital status in food security and climate change among the Barolong Borra Tlou le Tau in Ganyesa, Mme Kabuni (community knowledge holder) had the following to say on food security:

Go ya ka setso go ne go sena monna kgotsa mosadi yo o nyalang kgotsa nyalwang a sa tswe setswaneng mo Barolong Borra Tlou le Tau le mo ditsong tse dingwe tsa batswana e ne le tsela e ke rutilweng go ka netefatsa dijo mo lelapeng. Ke rutilwe ka ditiro tsa temo ya mo motseng, maemo a loapi le ditlha tsa temo, jaaka ditiro tsa go kotula le di kitso tsa go netefatsa gore dijo di dula di le teng ka dinako tsotlhe mo lelapeng. Sekai, jaaka mme yo o nyetsweng ke ne ke itse ka ditlhare tse di farologaneng tse di fitlhelwang mo motseng jaaka dijalo tsa ditlha tse di farologaneng, mefuta ya ditlhare tse di ka dirisiwang go dira molelo ka dine di amagangwa le khumanego le komelelo fa di ka dirisiwa. Jaaka mme o o nyetsweng, mosadi ebile gape ke le mme ke ne ke netefatsa fa go na le masaledi a dijo ka dinako tsotlhe. Sekai, ka dinako tse dingwe ke ne ke apaya motogo ke be ke o bedisa ke dira mageu a eleng gore a kgona go jewa jaaka dijo tsa mo mosong. Mageu ane a kgona go dula selekano sa beke pele ga a senyega.

According to Mme Kabuni, traditionally, no man or woman got married among the Barolong Borra Tlou le Tau and other Tswana ethnic groups without going to an initiation school as a rite of passage where she is taught to ensure food security for her household. She was taught about community farming practices, weather conditions and seasons for farming activities

including postharvest practices and technologies to ensure the availability of food at all times in the household.

She gave an example of her own experience as a married woman that she knew about the variety of plants found in the community including crops for different seasons, variety of trees that were not supposed to be used for firewood as they were associated with poor harvest and drought when cut. As a married woman, wife and mother, she ensured that there were enough supplies of food for the family at all times. For instance, in many instances she would cook soft porridge and ferment it to make “*Mageu*” a traditional drink which could be taken for breakfast in the morning. *Mageu* drink could last for about a week without being spoiled.

Rre Molwane (community knowledge holder) explained the role of marital status in rain-making by stating that:

Go ya ka meetlo ya Setswana Moroka ke motho wa rre yo o nyetseng. Ke tumela mo bathong gore fa moroka a sa nyala, ga a ga a bone tlotlo mo motseng le tshegetso ya badimo.

According to Rre Molwane, following the Batswana traditions a rain maker is usually a male and married person. He continued to explain that it is the belief among the people that when the rain maker is not married, he does not command the respect of the community and support of the ancestors.

This belief demonstrated the importance of marital status in the study community in relation to food security and issues related to climate change. A married person had a special social status in the community and commanded the respect and trust of the ancestors in the sustainable livelihood of the community. Certain community decisions pertaining to food security of the extended family and community were only made by married people as they had undergone the necessary initiation to take responsible decisions in such matters.

Every member of society went through that process when the right age and time came in his/her life cycle. These cultural aspects related to marital status as an important community socio-economic and demographic variable are not considered in western ways of knowing and knowledge production when investigating the socio-economic and demographic characteristics of African local communities. Table 4.3 shows the percentage distribution of marital status of the respondent community members

Table 4.3 Percentage Distribution of Marital Status of Respondent Community Members

Total number of respondents (Male = 15; Female = 25)

Marital Status	Male	Female
Married	53	56
Single	07	13
Divorced	10	03
Separated	03	00
Widowed	10	25
Cohabitated	07	03
Total	100	100

Table 4.3 shows that the majority of the respondents (53% males; 56% females) were married. Focus group discussions revealed that marriage was highly valued in the study community and most of the community knowledge holders with regard to the household and community food security, both men and women were married. The information they provided for the study was based on their own social practices and experiences.

4. 4. Educational Level and Indigenous Food Security for Climate Change Adaptation

The study was interested in establishing the way formal education addresses the issues of food security and climate change in the study community.

Mme Diabe had the following to say on education:

Thuto ya diphapusi borutelo jaaka e le teng gompiano ga e katise barutwana go emelana le dikgwetho tsa dijo mo maamong aa sa iketlang a loapi. Thuto ena e farologane le ya setso ee katisang basha ka mefuta ya kitso ya setso mo go tsoheng, temo, go tlhokomela leruo, dikologo, maemo aa bontsang gore re ipaakanye ka diphetoga tsa ditlha le maemo a loapi ka go itse le go ela tlhokomekgwa ya diphologolo jaaka, dinonyane, diphologolo tsa legae le ditlhare. Ee, thuto ya diphapusi

borutelo jaaka e ruta bana go emelana le dikgetlho tsa segompieno e tlhokago isa mo tlhogong le karolo ya thuto ya setso fa e le gore e nne maleba.

Mme Diabe had a critical view that formal education as it exists today does not prepare learners to meet the challenges of food security under changing climatic conditions. It is different from the traditional education which equipped the young with various forms of local knowledge and skills about hunting, farming, taking care of the animals, environment, early warning systems about changing seasons and the weather conditions by knowing and observing the behaviours of living organisms such as birds, domestic animals and plants. She acknowledged the significance of modern formal education as it taught children to meet the challenges of the modern world but argued that it needed to take into consideration the role of traditional knowledge if it is to be relevant.

The researcher agrees with Mme Diabe that there is a gap between classroom education and the practical expectations of the society when it comes to learner's preparedness to meet the challenges of food security under changing climatic conditions. This view is articulated by Odora-Hoppers (2002) and Hountondji (2002) who stress that the global dominant knowledge systems produced in research and academic institutions are in contrast with the local knowledge systems which most people depend on for livelihood including food security and climate change adaptation. Table 4.4 shows the percentage distribution of educational levels of the respondent community members.

Table 4.4 Percentage Distribution of Educational Levels of the Respondent Community Members

Total number of respondents (Male = 15; Female = 25)

Educational status	Male	Female
Informal education	52	60
Primary	15	04
Secondary	13	08
High school	00	16
Tertiary	20	12
Total	100	100

Table 4.4 shows that the majority of the respondent's, female (60%) and male (52%), had informal education. In-depth interviews revealed that these respondents, especially the women, had a wide knowledge about the indigenous knowledge related to food security and climate change adaptation. In-depth interviews showed that they knew about community farming systems, environmental issues, and early warning systems on climate change including behaviours of living organisms related to changing climatic conditions.

The study wanted to establish the household sizes of the study communities as important element of food security and climate change adaptation. This is due to the fact that observations and my own experience as member of the study community showed most of the households depend on subsistence farming for food security. The subsistence farming depends on labour power available in the household. Frigo (2004) defines a household as “the basic residential unit in which economic production, consumption, inheritance, child rearing, and shelter are organized and carried out”. The following section discusses the household sizes of the respondent community members. This is due to the role that household labour plays in food security under changing climatic conditions.

4.5 Distribution of Household Sizes and Indigenous Food Security for Climate Change Adaptation

The significance of household sizes in the study community was expressed by the community knowledge holder Mme Kgaole:

Ke goletse mmo lelapeng le legolo thata. Re ne re le lesometlhano bana ko gae (15). Rotlhe re ne re tshwanetse go tsaya karolo mo ditirong tsa lelapa, ditiro tse di farologaneng tsa temo le maikarabelo a lelapa. Re ne re romelwa le ko masikeng a a tlhokang thuso ka nako ya go bankanyetsa temo, go lema, le ka thobo, jalo jalo. Ka lelapa le ne le le legolo ditlhogo tsa lone di ne di netefatsa gore go lekane go fepa lelapa lotlhe go fitlhelela setlha se se latelang sa thobo. Mongwe le mongwe wa molelapeng oo mo dingwageng tsa maikarabelo o ne a tsaya karolo mo go netefatseng gore dijo di nna di le teng. Jaaka ke ne ke tla ke tsaya karolo mo ditirong tsena

tsa temo ke itseetse kitso ya setso ee botlhokwa thata mo go netefatseng gore dijo diteng ka nako ya maemo aa sa iketlang a loapi jaaka kitso ya tsiboso ya setso ka maemo a loapi.

According to Mme Kgaole, who grew up in a big household of about fifteen children, everyone was expected to contribute to household labour for the various farming activities as well as domestic responsibilities. They were also sent to other relatives who needed help during land preparation, sowing, harvesting periods, etc. Since the households were large the heads of households ensured that enough was produced to feed the household members till the next harvesting season. Each household member of the responsible age had to contribute to the household's food security. As she participated in the associated farming activities she acquired the necessary local knowledge related to food security in changing climatic conditions including the indigenous early warning systems' indicators.

Mme Gaobone a grandparent explained:

Mo setsong sa rona kgolo ya bana mo malapeng a rona a mantsi e dirilwe ke bagolo ba rona, thata jang bo mmemogolo. Ka ntlha ya gore bo mme ba ba boneng bana ba sa nyalwa ba a bereka, kgotsa ga ba na maitemogelo aa siameng a go godisa ngwana thata jang makgarejana. Ka jalo go dula le bagolo ba rona go ne go le botlhokwa thata mo kgodisong ya ngwana. Ke goletse ko go bonkgono re ne re le basetsana re le tlhano basimane ba le nne mo lapeng. Basetsana re ne re dira ditiro tsothe tsa mo lelapeng mo tlase ga tshupetso ya mmemogolo. Basimame ba tlhokomela leruo mo tlase ga tshupetso ya ga rremogolo.

Mme Gaobone explained that traditionally, much of the upbringing of children in the households was done by grandparents, and specifically the grandmothers. This was because many single mothers were working or some did not have adequate parenting skills to look after the children, especially the teenagers. Therefore, staying with the grandparents was crucially important for the upbringing of the child. She gave her own experience that, she grew with her grandparents. There were five girls and four boys in the household. The girls

participated in all the domestic activities under her guidance. The boys looked after the cattle guided by the grandfather.

The researcher’s view on the above experience narrated by Mme Gaobone demonstrates the importance of household labour in food security under changing climatic conditions. Each member of the household based on gender had a role to play for the survival of the household, especially when the household was big. Table 4.5 shows the percentage distribution of respondent community members’ household sizes.

Table 4.5 Percentage Distribution of Respondent Community Members’ Household Sizes

Total number of respondents (Male = 15; Female = 25)

Household size	Male	Female
One	07	04
Two-four	60	52
Five- seven	33	34
Seven and above	00	10
Total	100	100

Table 4.5 shows that the majority of the male (60%) and female (52%) respondent’s households had two to four members. During focus group discussions with community knowledge holders and practitioners it was found that ensuring food security was a household responsibility. The bigger the household size the greater was the demand for food security during climatic changes to avoid starvation.

Schultz (2009) explains that in most African local communities there is a rigid division of labour in farming activities by gender. This is usually influenced by the varieties of socio-economic and cultural activities performed on the farm. Men and women, as demonstrated in the study had specific activities for the survival of the household.

The study was also interested in establishing the occupational status of the respondent’s community members which ensured food security in changing climatic conditions. This is discussed in the following section (4, 6).

4. 6. Occupational Status and Indigenous Food Security for Climate Change Adaptation

According to the American Heritage Dictionary (4th Ed) (2009), occupation is defined as any activity in which a person is engaged. In this section the study was interested in establishing the community perspective about occupational status in relation to food security and climate change adaptation. Rre Gaeilo (community elder) provides his own perspective that:

Tiro e gantsi mo motseng wa rona e e netefatsang fa re bona dijo ke temothuo. Ene mo go yona borre, bomme le bana ba na le karolo e ba e tshamekang gore re fitlhelele dijo mo motseng le mo malapeng. Ka jalo bana ba ithuta ka tikologo le gofetoga ga ditlha le maemo a loapi.

According to Rre Gaeilo the most important activity in the community that ensures food security is agriculture. In these activity men, women and children have a role to play to ensure community and household food security. Children tend to learn about the environment as well as the changing seasons and weather conditions.

Mme Nono explains that:

Go latlhegela ke lefatshe ka ntlha ya kgolo ya batho go dirile gore bontsi jwa mafelo aa neng a dirisediwa go lema le bohulo a dirisediwe bodulo. Go nna teng ga dijo go ikaegile mo tlhokomelong ya lefatshe, sekai, ga go na le merwalela bontsi jwa lefatshe le le tlhwatlhwa mo temothuong le nna mo matshosetsing a kgogolego ya mmu. Lefatshe ga le re fe dijo fela le na le kamano le tumelo ya semoya.

Mme Nono indicates that the loss of land due to high population growth led to most of the agricultural and grazing land to be used for residential purposes. Food security depends on land security; she gave an example that when there is flooding a high proportion of the most valuable agricultural land is at risk of soil erosion. She further states that land is not only a source of food supply; it is connected with their spirituality.

The above narrative reveals that community perspectives of occupational status involve socio-cultural aspects. Table 4.6 shows the percentage distribution of occupational status of the community knowledge holders.

Table 4.6 Percentage Distribution of Occupational Status of the Community Knowledge Holders

Total number of respondents (Male = 15; Female = 25)

Employment status	Male	Female
Employed	15	4
Unemployed	13	18
Pensioner	20	20
Farmer	52	58
Others	00	00
Total	100	100

As indicated in Table 4.6, the majority of the male (52%) and female (58%) respondents are involved in the farming sector. This shows that farming is the most important activity the community members are involved in to ensure food security under changing climatic conditions. The table also shows that 15% of male and 4% of women are employed. This shows that rural-urban migration is high among men. Mme Motsei (Community knowledge holder) explained the significance of the above situation as follow:

Ka ntlha ya bo botlhoka tiro bo boleng mo motseng wa rona bontsi jwa bo rre ke bone ba amegang thata. Se sedira gore ba feleetse ba tswa ka motse baya ditoropong go ya go batla ditiro mo di maining, fa bomme bona ba sala mo ma lapeng go tlhokomela bana le leruo kgotsa temo ee ka beng e le teng. Mme mo motseng wa rona temothuo e santsane e le yone e rephelang ka yone mo tlase ga maemo aa fetogang a loapi. Mme bontsi jwa nako bomme ke bone ba leng matlhagatlhaga mo temothuong kabo rre ba le ko ditirong. Botlhokwa jo bo golo ke gore fa bomme ba setse jaana mo gae ba

tlhokometse temothuo go iphidisa, borre le bone batla
okeletsa mo godimo go tokafatsa maemo a botshelo le
gore dijo dinne di le teng ka dinako tsotlhe.

According to Mme Motsei most men left the village in search of employment opportunities in the mines, hence women were left at home to be heads of the families and take care of the households and farms. She continued that farming was the source of food supply under changing climatic conditions. In many instances women manage the farms while men are away working. She indicated that the importance of women being at home is that income from both sides can help the family to have food at all times.

The researcher's opinion is that, although not specifically outlined by respondent community members especially women, it can be brought forth that women have many more responsibilities compared to men since they nurture children, as well as maintain responsibility for household chores and farming activities. This discovery is supported by Broca (2002) who argues that generally women have more responsibilities compared to men. Interestingly, the fact that community members in Ganyesa village believe ancestors provide fertility of the land means that we cannot neglect the role of ancestral belief in food security and climate change adaptation. The section below discusses the role of religion in food security and climate change adaptation.

4.7 Religious Affiliations and Indigenous Food Security for Climate Change Adaptation

In this section the study was interested in establishing the role of religion in relation to food security and climate change adaptation. Taking into consideration the fact that people in Ganyesa believe that ancestors provide fertility of the land, high yield, rain etc., it shows that religion plays a crucial role in their way of obtaining food under changing climatic conditions. Indigenous knowledge practitioner Rre Mobe explains that:

Tumelo ena le karolo e ntsi thata mo matshelong a rona
jaaka re le Batswana. Temothuo ya rona e ikaegile mo
tumelong ka gore pele ga temo go direlwa badimo
setlhabelo go kopa thobo e ntle mo go bone. Mme
morago ga thobo le teng kgomo e a tlhabiwa ya
malebogo ko badimong go direla gore re tsewelele go nna

le thobo e ntle. Tlhokomelo le tlotlo ya lefatshe ke ngwe ya meetlo wa motse ka le re fa dijo. Ke ka mo fa mongwe wa ntlo ya bogosi a sena go tlhokafala ga go lemiwi ka nako ewa. Ka gore go na le tumelo ya gore fa badimo ba sa itumela ba kgona go hutsa leefatshe la rona ba tlisa komelelo.

According to indigenous knowledge practitioner Rre Mobe, religion has a critical role in their lives as Batswana. Their indigenous agricultural practices depend on religion because before planting they sacrifice to the ancestors in request of a good harvest. Even after a good harvest they slaughter a cow as a sign of appreciation to the ancestors. This is mainly done in order to continuously have a good harvest. Conservation and respect for the land is one of the main values of the community. Land is not cultivated when somebody from the royal house has just passed away. Rre Mobe maintains that there is a belief that if the ancestors are not happy they can curse their land and bring drought.

The researcher’s opinion is that religious beliefs and practices play a significant role in the lives of people in Ganyesa. That is, religious beliefs have important connections with their everyday life activities from attaining food, ways of farming and lessons in how to live harmoniously with their surrounding environment. Table 4.7 shows the percentage distribution of religious affiliation of the community knowledge holders and practitioners.

Table 4.7 Percentage Distribution of Religious Affiliation of the Community Knowledge Holders and Practitioners

Total number of respondents (Male = 15; Female = 25)

Religious affiliation	Male	Female
African religions	60	72
Christianity	40	28
Islam	00	00
Others	00	00
Total	100	100

Table 4.7 shows that the majority of female (72%) and male (60%) respondents believe in African religious practices on food security and climate change adaptation. Rre Morei (community knowledge holder) explains that:

Gona le le ditiro tsa tumelo tse e leng gore di amana le temothuo ya setso. Gona le ditlhabo,me neelo ya badimo go kopa thobo entle, go itumelela thobo entle, go kopa pula le tsidingwe tse dintsi. Tlotlo ya badimo, bagolo le tikologo ya tlhago ke dingwe tsa di meetlo ya rona mo motseng wa Ganyesa ee tsholetsang temo ya rona ya setso.

According to Rre Morei there are religious performances that are more connected to indigenous ways of farming. There are ceremonies and sacrifices to ancestors in request for good yields, ceremonies to appreciate good yields, to request for rain and many more. Respect for the ancestors, elderly people and the natural surroundings are amongst the sincere morals of the Ganyesa social structure that are rooted in indigenous agriculture.

The researcher's view is that indigenous agricultural systems in the community of Ganyesa are strongly dependent on the African religious morals and principles of the people for success. For instance, religious festivals such as "mpho ya badimo" (thanks giving ceremony to the ancestors) are also big meal occasions that bring families together.

CHAPTER FIVE

AFRICAN INDIGENOUS FOOD SECURITY STRATEGIES AND THEIR USES FOR CLIMATE CHANGE ADAPTATION AND COMMUNITY LIVELIHOOD

This chapter discusses the existing African indigenous food security strategies and their uses for climate change adaptation and community livelihood. This is based on the argument that the introduction of modern, especially large scale farming in South Africa might have had great success in the past, but a large percentage of people in the country, especially in the rural areas such as Ganyesa, are experiencing food insecurity as subsistence farmers due to vulnerability to climatic changes (A Re Ageng, 2001). These subsistence farmers, mostly women, still depend on their local knowledge and technologies in agriculture for food security. These are low cost and locally available technologies and inputs which enabled them to adapt to changing climatic conditions in an arid environment of Ganyesa. The chapter is divided into the following sections: indigenous community sources of food security and their uses for climate change adaptation.

5.1. Indigenous Community Sources of Food Security for Climate Change Adaptation

The study was first interested in establishing the local community sources of food supply. These are well presented by Mme Kgaole:

Temothuo, thobo le go tsoma, segolo jang temothuo e sale ele yone re bonang dijo mo go yone mo motseng wa ganyesa. Ke godile ke itse gore temothuo, go rua diphologolo le go jala bo mabele le mmidi ke ka mo re bonang dijo teng. Le go rua diphologolo jaaka, dikgomo, dinku, dipodi le dintswa. Go tsoma go ne go dirwa ke banna le basimane ka dinako dingwe. Ka dinako tsa dipula basadi le basetsane ba ne ba kgetlha merogo le maungo a naga. Le mo gongwe, diphologolo tsa legae jaaka dikgomo, dinku le dipodi di ne di dirisiwa mo meletlong ya setso jaaka, lenyalo le go direla badimo setlhabelo mo mabakeng aa fariologaneng a botshelo jaaka go kopa thobo e ntle.

According to Mme Kgaole farming, gathering and hunting, but especially farming has always been the main source of food supply in the community of Ganyesa. She grew up knowing that agriculture, both the keeping of animals and growing of crops such as sorghum and maize, was the main source of food. They kept animals such as sheep, cows, goats, chickens and dogs. Hunting was done by men and boys occasionally. During rainy season's women and girls collected wild vegetables and fruits. She indicated that the people knew about the environment as well as the changing seasons and weather conditions. However, domesticated animals such as cows, sheep and goats were also used for cultural functions including paying bride price "lobola" and sacrifices for the ancestors for various life aspects such as in request for good harvest.

However, Mme Katlego elaborates:

Fa re akanyisisa Ganyesa ke lefelo le le omeletseng ebile ga le a nonofa go lema dijalo, go rua diphologolo kgale go le botlhokwa mo go netefatseng dijo le go emelana le maemo a loapi. Dikgomo mo motseng wa rona di bontsha botshelo jwa Batswana. dikgomo o kgona go di rekisa kgotsa go di fetola ka dijo, di re fa dijo le letseno ebile dire fa le dikungo tsa mmu go lema.

However, Mme Katlego elaborates that taking into consideration that Ganyesa is a semi-arid area and not very conducive for crop production, animal farming has always been very crucial for food security and climate change adaptation. She indicated that cattle in the village symbolized the life of Batswana people. Cattle can be sold or exchanged for food, provide food and income and also supply manure for farming.

5.2. The Community Uses of Indigenous Knowledge and Skills

The study wanted to establish the uses of indigenous knowledge systems in the community for food security and climate change adaptation. This took into consideration the fact that a large proportion of the community based food security activities were done by women. Mme Diboka (community knowledge holder) explained:

Bomme ba dira di peresente tse some a robedi (80%) mo tirong ya temothuo ee totileng go netefatsa dijo mo

motseng le fa e tswelera go nna mo kotsing ya phetogo ya loapi. Le fa gontse jalo re ithutile go tshela mo diphetogong tsa loapi ka tiriso ya ditiro tsa kitso ya rona ya setso tsa go emelana le diphetogo tsa loapi.

Mme Diboka (community knowledge holder) revealed that women constitute about 80% of the agricultural activities related to food security in the community and are increasingly at risk of the impact of changing climatic conditions. However, overtime they have learnt to live under changing climatic conditions using their community based knowledge systems to adapt.

Direct observations and having grown up in the Ganyesa community revealed to the researcher that women have a broad knowledge about the community, and have established good social networks within the community. These networks play an important role in managing resources for food security and climate change adaptation.

The researcher has the opinion that women play a significant role in ensuring household and community food security despite changing climatic conditions and their roles need to be taken into consideration to enable them to become effective participants in addressing the challenges of the 21st century such as climate change and food security. This is supported by Labintan (2010) who argues that in most areas of South Africa, women are the major subsistence farmers providing the basis of livelihood and community sustainable livelihood. The majority of them depend on their local community based agricultural knowledge and innovation systems for agricultural production.

Mme Mokudi (knowledge holder) elaborated that:

Le fa gontse jalo re ithutile go tshela mo diphetogong tsa loapi ka tiriso ya kitso ya rona ya setso mo go boneleng pele maemo a loapi ka go ya ga phefo, dinaledi le go ela tlhoko mekgwa ya ditshidi mo motseng. Mekgwa ya ditshidi jaaka dinonyane, ditlhare le diphologolo tse e leng gore ke ditsibosi tsa phetogo ya loapi go netefatsa dijo. Mme jaanong go emelana le maemo a loapi re dirisa mokgwa wa setso wa go gelela metse le tlhokomelo ya metsi go netefatsa tshwarelelo ya metsi mo mmung oo sa

nonofang. Go netefatsa fa dijo dinna di le teng re dirisa mokgwa wa go somarela dijo jaaka go bedisa le go omisa ka letsatsi.

The respondent women knowledge holder, Mme Mokudi, indicated that women have learnt to adapt to climate variability through the use of indigenous knowledge to predict the weather with wind directions, stars and observation of the behaviour of living organisms in the community. The behaviour of living organisms such as birds, vegetation and animals related to early warning systems on climate change adaptation for food security. Indigenous adaptation strategies were water harvesting skills and water preservation methods to increase water holding in crumbly soils. To ensure food at all times they used food conservation methods such as fermentation and sun drying, mixed cropping and crop variation.

Rre Mooki (knowledge practitioner) explained:

Go tswa kgale re ithutile go tlhokomela leruo ka tiriso ya kitso ya rona ya setso motlase ga phetogo ya loapi. Jaaka go dirisa dijo tsa tlaletso go fepa leruo, go kgaphela thoko mahulo gore a dirisiwe ke tse dinnye, tse di bobolang le tse di a nysisang fa go ka nna komelelo. Tiriso ya kitso ya setso go tlhokomela malwetsi mo leruong gore di le kgone go emelane le diphetogo tsa loapi.

Rre Mooki (knowledge practitioner) explained that, over time community members have learnt to maintain livestock through the use of indigenous knowledge under changing climatic conditions. Such knowledge includes the use of supplementary feed for livestock; and reserving pasture for use by the young; sick and lactating animals in case of drought. The use of indigenous techniques to control diseases in livestock so that they can survive climate extremes is another useful tool held by women farmers.

Observations and in-depth interviews showed that women farmers used community knowledge based practices which included gender specific knowledge about indigenous fauna and flora, especially the use of early warning systems to forecast changing climatic conditions over periods, seed selection to evade the risk of drought; mixed and or intercropping and diversification to ensure food security.

CHAPTER SIX

RESPONDENT COMMUNITY MEMBERS' AWARENESS AND KNOWLEDGE ABOUT CLIMATE CHANGE ADAPTATION

Climate change is a critical subject around which, worldwide development policies are being formulated. The study was interested in establishing the respondent community members' awareness and knowledge on climate change adaptation. The results are reflected in Table 6.1.

Table 6.1 Percentage Distribution of Respondent Community Members on Awareness and Understanding of Climate Change

Extent of Awareness of Climate Change		
	Male	Female
Yes	93	92
No	7	8
Understanding of Climate Change		
Extreme Rainfall	60	64
Increased Incidences of Drought	13	12
Crop and Livestock Failure	7	12
Pests and Infectious Diseases	7	4
High Winds and Heat Waves	13	8

*Male 15; Female 25

Table 6.1 shows that the majority of male (93 %) and female (92%) respondents are aware of climate changes. During focus group discussions and in-depth interviews it was revealed that they have experienced extreme rainfall, increased incidences of drought, high winds and heat waves, pests and diseases, crop and livestock failure.

This study also wanted to establish the understanding of climate change held by the knowledge holders. Table 6.1 shows that the majority of male (60%) and female (64%) understood climate change as being inextricably related to crop and livestock failure. Male (13 %) and female (12%) respondent's related climate change to excessive rainfall while male (7%) and female (12%) understood it as increased incidences of drought. Some community member's (male (7%) and female (4%)) understood climate change as being related to pests and infectious diseases while male (13%) and female (8%) regarded climate change as being linked to high winds and heat waves. This shows that community members have an idea about changing climatic conditions.

Table 6.2 Percentage Distribution of Respondent Community Members on Sources of Information on Climate Change

Source	Male	Female
Extension workers	13	8
Relatives and Friends	13	12
Farmers Cooperatives	13	4
Politicians	7	8
Internet	7	16
Newspapers	20	20
Radio/TV	20	24
Researchers	7	8

*Male 15; Female 25

Table 6.2 presents different sources of information on climate change. Awareness on climate change effects is associated with the access to the use of available information on the issue. It was discovered, however, that the mass media (radio or television and newspaper) has a greater significant part in climate change awareness in the study area. It is evident from Table 6.2 that the community's major source of information on climate change was the radio or television (male 55% and female 69%), newspaper (male 49% and female 41%), relatives and friends (male 44% and female 51%). Other sources included internet (male 17% and female 10%); researcher's (male 15% and female 17%); extension workers (male 14% and female 14%); farmers' co-operative (male 12% and female 20%); and politicians (male 4% and female 2%).

6.3. Indigenous Interventions for Climate Change Adaptation in Ganyesa Village

Most countries, especially developing countries which are the most vulnerable to the effects of climate change are devising and implementing various policy strategies for climate change adaptation. However, most of these policy strategies have not taken local knowledge and experiences of the people into consideration. This has partly contributed to the unsustainability of the policy strategies.

However, different approaches have been developed by small scale farmers especially women in the study area for climate change adaptation. Mme Moobi (community knowledge holder) indicates that:

Bodumedi botsewa ka ngwe ya dilo tse dinang le bo kgone jwa go fatlhosa maikutlo a tirisano mmogo le go tshosometsa karolo mo tikologong yotlhe. Moetlo wa go dira pula e ne o ka na wa tsewa ka maikaelelo a moletlo ka gonne e diragala ka nako e rileng jara e ngwe le engwe ka maikaelelo a go dira gore pula e ne. Mo moletlong o basadi le basetsana ba opela dipina tse malebana le pula tse di tshamekang karolo e botlhoka mo go rapeleleng pula. Mo malatsing a kgale go ne go tlwalesegile mo morafeng wa Batswana gore ngwaga o mongwe le o mongwe pele go lengwa moletlo wa go dira pula e ne one o diriwa. Go kaiwa gore le mo dinakong tsa se gompiano go na le merafe e me ngwe ya Batswana e e dirang moetlo o lefa gontse jalo se gase diragala kgapetsa kgapetsa.

According to indigenous knowledge holder Mme Moobi religion is considered as having the ability to produce moral solidarity, and invoking membership in the entire society. The rain making ritual may be said to be an intentional ceremony because it only occurs in a specific time of the year with the specific intention of making rain. In this ritual woman and girls

perform rain songs which constitute a vital part of the prayers for rain. In the olden days it was common among the Batswana tribes that annually, before ploughing, a rainmaking ceremony was conducted. She further stated that there are some Batswana tribes that still perform the ritual, but this seldom happens now.

The researcher's view is that the ritual of making rain or "spiritual approach" has been practiced for a very long time especially among the Batswana and people always got the positive results in this ritual. This is supported by Collins (1988) that among the Batswana societies, rainmaking can be seen as a formal ritual. It was further noted from focus group discussions that "these changes are brought about by God and that they can only pray for mercies". Mme Kabo (indigenous knowledge holder) explains that:

Go lema dijalo tse di sa tseyeng nako e telele (sepinache, diaiye, digwete, dikabeche, ditamita, magapu le maphutshi) le go lema ka kgogolammoko kgale go tumile mo motseng mo dingwageng tse di fitileng. Mo dingwageng tse di fitileng, temothuo, tiriso ya dikungo tsa tlhago le tshomarelo ya thotse kgale di dirisiwa jaaka mokgwa wa go emelana le phetogo ya loapi.

According to indigenous knowledge holder Mme Kabo, the planting of early maturing short season crops (spinach, onions, carrots, cabbage, tomatoes, watermelon and pumpkins) and planting with early rainfall has been popular in the community for the past years. Over the years, mixed farming, the use of organic manure and preservation of seeds have been used as adaptive strategies for climate changes. Rre Mokai (community leader) elaborated that:

Go gagamadiwa ga tlotlo ya meila, ditori le meetlo ya setso ya temothuo ke ngwe ya mekgwa ee dirisiwang go emelana le phetoga ya maemo a loapi. emelane le kgwetlho ya go fetoga ga maemo a lewapi. Se na ke ka ntlha ya gore dingwe tsa meila, ditori le meetlo ya setso ya temothuo di amangwa le komelelo le go sa tlotle badimo. Go apesa dijalo ka dipolaseteke ka nakong ya mogote oo feteletseng go thibela dijalo go sha, go fokotsa

kgolo ya mohero le go sireletsa mowanyana oo metsi mo mmung. Le go reetsa mafaratlhatlha a semoya ka tshedimosetso ya phetogo ya loapi jaaka megwa ya go emelana le diphetogo tsa loapi.

Rre Mokai (community leader) added that strengthening respect on the local indigenous taboos, stories and myths of farming is one of the strategies used to adapt to climate changes. This is due to the fact that some local indigenous taboos, stories and myths of farming are associated with drought and disrespect for the ancestors. He further pointed out the covering of crops with plastic during hot seasons to prevent high temperatures to burn crops, reduce weed growth and conserve soil moisture, as well as listening to climate change information on mass media as adaptive measures for climate changes.

The researchers view is that community members have developed different coping strategies which play a very crucial role in ensuring food security and climate change adaptation. It shows that early maturing short season crops start to be preferred in the community as a form of least costly adaptation strategy to ensure food security. This is supported by Bryan et al. (2013) that changing crop varieties early or late maturing varieties are perceived as the most common and least costly adaptation strategies. This is confirmed by a study in Ethiopia, indicating that as part of an integrated coping strategy, crop genetic diversity (in the form of drought resistant and early maturing varieties and crops) is considered as preferable by the farmers (Asfaw et al. 2013). Other noteworthy adaptive measures reported included the role of mass media in providing information on climate changes.

During focus group discussions community knowledge practitioner Mme Kgalo said that while observing the signs of climate change they applied the above mentioned adaptive methods and they have been helping in agricultural activities to ensure food security and climate change adaptation. She further stated that they did not learn the practices from anywhere and that they are local innovative strategies that have been used for over many years even before climate change became a significant subject in development discourses.

There researchers view is that, from the abovementioned, it is evident that community members have been applying their community based approaches for climate change adaptation even before climate change became a relevant subject issue in development

discourses. The discovery that these innovative approaches and methods are indigenous to the community members could provide some suggestions for climate change and community development policy if they are documented and disseminated for sustainability. This is in line with Robinson and Herbert (2001) who argue that integrating indigenous knowledge into climate change programmes can lead to the development of active adaptation approaches and methods that are cost-effective, participatory and sustainable.

6.4. Prospects and Challenges of African Indigenous Interventions for Climate Change Adaptation

African indigenous communities such as Ganyesa have long been known as being particularly at risk from the impact of climate change due to the close connection between their livelihoods, culture, spirituality, social systems and the environment. At the same time, this deep connection and long traditional relationship with the natural environment affords the people with community based knowledge that they have long used to cope with environmental changes, including the impacts of climate change.

During focus group discussions community knowledge holders reiterated the need for acknowledgment of indigenous knowledge systems, which they have sustainably used and practiced for generations for sustainable livelihood including adaptation to changing climatic conditions. For instance, the use of IK on observing the behaviour of living organisms as early warning systems to changing climatic conditions.

Furthermore, it was observed that their connection to land was an important source of resilience which depended on the ability to nurture and manage the relationship between land use and changing climatic conditions. For instance during the in-depth interviews a respondent community knowledge holder pointed out the importance of local control and knowledge of natural resources for climate change adaptation and long term community resilience. Mme Kabo explained that:

Tlhokomelo ya di diriswa tsa setso e botlhokwa tota ka gore ga re ikgatolosa kgotsa re nyenyefatsa tlhokomelo ya didiriswa tse na tsa rona tsa setso jaaka gone go dirwa ke mebuso ya tlhaolele, thata jang lefatshe le oketsa go amega

thata ga batho mo diphetogong tsa maemo a loapi. Mebuso ya tlhalele ene e ntsha batho mo mafatsheng a bona a segosi a baneng ba iphidisa ka one.

Mme Kabo emphasized the importance of local community control of indigenous resources for climate change adaptation. Undermining local control over these local indigenous resources as was done during the period of colonialism and apartheid, increased the vulnerability of the people to climate changes. Colonialism and apartheid dispossessed people of their tribal land which they depended upon for livelihood.

The researcher supports this contention because control and security of local resources such as land and the resulting ability to produce the basic needs of life is a pre-condition for sustaining the resilience of indigenous communities under changing climatic conditions.

The study found that respondent community members made careful observations about their available local resources used for climate change adaptation, exchanged information and practices, for future planning. New initiatives sprung up, based on experience based knowledge, and cooperation between indigenous peoples and scientists who are generating new knowledge to approach and address the effects of climate change.

However, during focus group discussions and in-depth interviews it was indicated that indigenous measures for climate change adaptation are faced with many challenges. Indigenous knowledge practitioner Rre Ruui pointed out that young people in the community have no interest in the indigenous knowledge systems due to modernisation. This is explained by community elder Mme Katlego:

Tota ga jaanong ditlhabologo di tlisitse diphetogo tse di ntsi thata mo kitsong ya go netefatsa gore go na le dijo le ya go emelana le maemo a loapi. Bokete thata diphetogo di tlile ka thuto ya segompieno mo temothuong ee rutang batho ka mekgwa e mentsha ya go lema. Sekai tlhagiso ya go tlhakatlhakanya dipeo gore go nne le thobo ee itumedisang le diriso ya di kungo tsa dikhemikhala mo mmung. Go tla ga thuto e ntshwa mo temothuo mo

leineng la ditlhabologo di isitse serodumo sa kitso ya rona ko tlase segolo jang mo temothuong. Bontsi jwa ba lemiruo mo motseng wa rona baile ba rutiwa go dirisa dikungo tsa sesha le go lema dipeo tse ditlhakatlhakaneng. Ka ntlha ya thotloetso go tswa mo balemising mokgwa wa temo ya setso o ile wa fetoga le fa balemirui ba ise ba totobale sentle ka kitso ya temo encha. Mo motseng wa rona mokgwa o mosha wa temo ga o dirisiwe ke bontsi jwa batho ka thuto ya teng e se bonolo ebile o tlhoka madi go filthelela di diriso tsa teng.

According to Mme Katlego, the invasion of modernization brought about change in the use of community based knowledge systems in areas of food security and climate change adaptation. She emphasized that these changes came with new systems of education in agriculture which introduced new ways of farming. She gave an example of the introduction of hybrid seeds to produced higher yields and chemical fertilizers. Most farmers in the village are taught about new methods of farming, how to plant hybrid seeds and use chemical fertilizers. She explained that as a result of the influence from agricultural extension officers, indigenous agricultural farming practices changed even though farmers are not certain about the new method of farming. In the village most people do not use modern methods of farming because the methods need special education and money to buy its facilities.

With the widespread adoption of Christianity, indigenous spiritual practices and belief systems such as taboos associated with the protection of environment and preservation of biodiversity are now seen as superstitions. The researcher has the view that this has affected the base of IKS which people used sustainably to adapt to climatic changes.

The researchers view is that each knowledge system has its own challenges and prospects therefore each knowledge system should be accorded opportunity particularly in climate change discourses for sustainable adaptation solutions. Hence, the documentation and dissemination of successful community-based adaptation initiatives can contribute to global adaptations for effective responses. The researcher agrees with Nyong et al. (2007) that indigenous knowledge about how local communities have survived during past climatic

conditions has the potential of providing significant guidelines for environmentally friendly based approaches for the present and future climatic incidences.

CHAPTER SEVEN

CONCLUSION AND RECOMMENDATIONS

This Chapter presents the conclusion and recommendations emanating from the research findings.

7.1. Conclusion

The study used a predominantly qualitative and participatory research design to investigate the African Indigenous Food Security Strategies and Climate Change Adaptation in Ganyesa village (North-West Province). The role of socio-economic and demographic characteristics such as age group, marital status, and religious affiliation, occupational and educational status was examined from the community perspective. This is contrary to the common western perspective of looking at these variables independent of the cultural perspectives of the respondents. It was found that these variables had socio-cultural and spiritual significance in the community livelihood of the Barolong Borra Tlou le Tau people in Ganyesa.

African rural communities in the arid environment of the North-West Province such as Ganyesa have always been vulnerable to food insecurity due to drought conditions associated with climate change. Most of them are women subsistence farmers. However, over the years they have developed their own indigenous knowledge-based strategies of ensuring food security in changing climatic conditions. The study revealed that women in the study community made up about 80% of the agricultural work force related to food security. Their role in indigenous food security for climate change adaptation was multidimensional. They were the main agricultural producers (both crop and animal production), food processors and preservers for household food security.

They demonstrated extensive knowledge about the indigenous food security strategies with regard to climate change adaptation through weather prediction using wind directions, position of stars, and observation of behaviours of living organisms as early warning indicators of changing climatic conditions. The elderly women have, over the years, developed and used indigenous adaptation strategies such as water harvesting skills and water preservation methods to increase water holding in crumbly soils; to ensure food at all times

they used food conservation methods such as fermentation and sun drying, mixed cropping and crop diversification.

It was also found that early maturing short season crops were preferred in the community as a form of least costly adaptation strategy to ensure food security. Other noteworthy adaptive measures reported included the role of mass media in providing information on climate changes. The respondents expressed scepticism of modern food security strategies for climate change adaptation due to being costly and environmentally unfriendly.

Consequently, very few farmers, especially women adopted these modern strategies. The knowledge holders still pride themselves in their way of doing things, trial and error was perceived as a way of life until they understood well how to adapt to the changing climate. The knowledge holders believed that their ways are nature friendly as they regard natural resource as a gift that is revived from the ancestors thus it is their responsibility to maintain and manage it to the best of their ability. Moreover, they thought their technologies were cost effective.

7.2. Recommendations

The study recommends the need for documenting existing indigenous food security strategies for climate change adaptation in the community. This is to ensure the protection and preservation of these knowledge systems for future generations. They should be shared with younger generations, agricultural extension officers and policy makers for sustainability. This should include their introduction into the educational system and agricultural development campaigns to promote knowledge and awareness of their significance among different stakeholders within and outside the local communities.

Documentation will assist in identification of gaps in these knowledge systems which could be improved through interface with other knowledge systems to meet the challenges of globalization. The role of gender should be taken seriously in the documentation, promotion and interface of indigenous and other knowledge and technology. These initiatives should improve the role of women rather than marginalize and alienate them as the main producers and users of these indigenous knowledge systems.

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APPENDICES

Appendix A: Ethical Clearance

28 January 2014

Ms Tlhompho Gaoshebe (213572441)
School of Social Sciences
Howard College Campus

Protocol reference number: HSS/0013/014M

Project title: African Indigenous Food Security strategies and climate change adaptation in South Africa with special reference to Ganyesa Village (North-West Province)

Dear Ms Gaoshebe,

Full Approval – Expedited

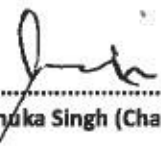
In response to your application dated 20 November 2013, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol have been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.

Please note: Research data should be securely stored in the discipline/department for a period of 5 years.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully



.....
Dr Shenuka Singh (Chair)

/ms

Cc Supervisor: Professor HO Kaya
cc Academic Leader Research: Professor Sabine Marschall
cc School Administrator: Mr N Memela

Humanities & Social Sciences Research Ethics Committee

Dr Shenuka Singh (Chair)

Westville Campus, Govan Mbeki Building


Postal Address: Private Bag X54001, Durban 4000

Telephone: +27 (0) 31 260 3587/8350/4557 Facsimile: +27 (0) 31 260 4609 Email: ximbap@ukzn.ac.za / snvmanm@ukzn.ac.za / mohung@ukzn.ac.za

Website: www.ukzn.ac.za



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Appendix B: Acceptance Letter from the Community Headman



REF: 8/2
ENQ : L.L. GALEHOSE
TEL: 0539983305

Private bag x 507
Ganyesa
8616

To whom it may concern

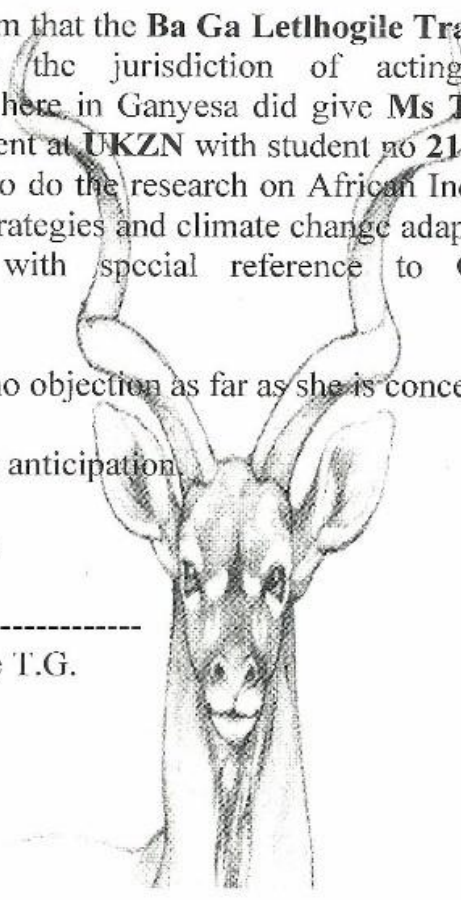
This is to confirm that the **Ba Ga Letlhogile Traditional Council** under the jurisdiction of acting **Kgosi T.G.Letlhogile** here in Ganyesa did give **Ms Tlhompso Gaoshebe** student at **UKZN** with student no **213572441** the permission to do the research on African Indigenous food security strategies and climate change adaptation in South Africa with special reference to **Ganyesa Village(NWP)**

This office has no objection as far as she is concern

Thanking you in anticipation.

Yours

Kgosi Letlhogile T.G.



Appendix C: English/Setswana Informed Consent Form



Informed Consent Form

Title: African Indigenous Food Security Strategies for Climate Change Adaptation in North-West Province with Special Reference to Ganyesa.

Researcher: Gaoshebe Tlhompho

The purpose of the study:

As part of the requirements for Master's Degree at University of KwaZulu-Natal, I have to carry out a research study. The study is concerned with the Indigenous food security systems that receive little attention in the search for sustainable solutions for food security. Yet a large part of the population in the rural areas of South Africa including Ganyesa, depend on them for survival and adaptation to changing climatic conditions. Moreover, they have not been adequately documented to inform policy development and to be shared with the youth for sustainability.

You will be asked to answer a number of questions regarding your experience and indigenous knowledge. I do not anticipate any inconveniences or risks resulting from this study. If there are any questions posed to you during the study that cause discomfort, you are free to refuse to answer them. Your participation is voluntary. Refusal to participate and withdrawal of your consent or discontinued participation in the study will not result in any penalty.

The result of this study will be presented anonymously. I will ensure that no clues to your identity appear in the thesis. Any extracts from what you say that are quoted in the thesis will be entirely anonymous. The data will be kept confidential for the duration of the study. On completion of the thesis, the result will be seen by my supervisor, a second marker and the

external examiner. The thesis may be read by future students on the course. The study may be published in a research journal.

If you have any questions about the study, you can contact me:

Mobile number: 082 843 6381, Email address. 213572441@stu.ukzn.ac.za

HSSREC research office contact details: Ms. P Ximba

Tel number: 031 260 3587, Email address: ximbap@ukzn.ac.za

Time duration of the study: two months

Consent Form

I.....agree to participate in Tlhompho Gaoshebe's research study.

The purpose and nature of the study has been explained to me in writing. I am participating voluntarily. I understand that I can withdraw from the study, without repercussions, at any time, whether before it starts or while I am participating. I understand that I can withdraw permission to use the data within two weeks of the interview, in which case the material will be deleted. I understand that anonymity will be ensured in the write-up by disguising my identity. I understand that disguised extracts from my interview may be quoted in the thesis and any subsequent publications if I give permission below:

(Please tick one box :)

I agree to quotation/publication of extracts from my interview

I do not agree to quotation/publication of extracts from my interview

I hereby consent to have this interview recorded

I hereby do not consent to have this interview recorded



Signed.....

Date.....



UNIVERSITY OF
KWAZULU-NATAL
INYUVESI
YAKWAZULU-NATALI

Kitsiso ya Foromo ya Tumulano

Setlhogo: Mekgwa ya go Tlhokomela Dijo wa Seaforika le Maemo a Lowapi mo Aforika Borwa go Lebeletswe Motse wa Ganyesa (Porofense ya Bokoni Bophirima)

Mobatlisisi: Gaoshebe Tlhompho

Lebaka la patlisiso:

Jaaka karolo ya ditlhokego tsa mophato masters ko setheo se segolo sa KwaZulu-Natal , ke tswanetse go dira dipatlisiso. Patlisiso e batlisisa mekgwa ya setso ya go somarela dijo le mekgwa ya go go emelana le phetogo ya maemo a lowapi mo aforika borwa go lebeletswe motse wa ganyesa (bokoni bophirima). Patlisiso e e botlhokwa ka gore batho bale bantsi mo motseng wa ganyesa ba dirisa mekgwa wa setso wa go somarela dijo go iphidisa, ga bakwala gope ka melawana ya go dirisa mekgwa e.

Mekgwa e e ya setso e kgadilwe gore ga e santifiki le gore gae kgone go itepatepanya le mekgwa ya sekwalekwale. O tllile go bodiwa dipotso mabapi le maitemogelo a gago A kitso ya setso. Ga ke bonele kotsi ko pele kgotsa kgoreletso epe go tswa mo patlisisong e. Fa go na le dipotso tse o ka dibotsiwang ka nako ya patlisiso ena tse di ka dirang gore o sephuthuloge o gololosegile gore oseke wa diaraba, o gologosegile go tsaya karolo mo patlising, go tlogela mo tseleng ga gago ga gona kotlhaio epe e o tla e bonang.

Ditlamorago tsa patlisiso e di tllile go beiwa mo sephiring. Ke tla dira gore ga gona masaledi a lona mo patlising e seo seraya maina. Sengwe le sengwe se o tla sebuwang mo patlising ena setlile go tlhoka leina. Sengwe le sengwe se lo sebuileng se tllile go nna mo sephiring go fitlha pheleletsong ya patlisiso ena. Mo bokhutlong jwa patlisiso ena , bokhutlho jwa go bonwa ke motlhatlhoi wa me, mo tlhatlhoi wa bobedi le motlhatlhoi wa kontle. Patlisiso ena e ka balwa ke barutwana ba nako ee tlang mo serutweng sena. Patlisiso e ka nna ya phatlhaladiwa mo dijenaleng tsa dipatlisiso

Fa o na le potso ngwe mabapi le patlisiso ena, o ka nteletsa mo: Dinomere tsa mogala: 082 843 6381, Email e aterese. 213572441@stu.ukzn.ac.za; HSSREC kantoro ya dipatlisiso: Ms. P Ximba

Nomere tsa mogala: 031 260 3587, Email e aterese: ximbap@ukzn.ac.za

Sebaka sa patlisiso: dikgwedi tse pedi

Foromo ya Tumalano

Nna.....ke dumalana go tsaya karolo mo patlisisong ya ga Tlhompho Gaoshebe.

Mosolo le mogwa wa patlisiso ena ke o tlhaloseditswe mo mokwalong. Ke tlhaloganya gore ke gololosegile go tswa mo patlisisong ena ntle le kotlha epe ka pa ditlamorago nako engwe le e ngwe, e katswa pele ga e simologa kapa ke tsaya karolo. Ke tlhaloganya gore ke gololosegile go fetoga ka tshedimisetso ya me mo nakong ya dibeke tse pedi tsa putsisiso mo e leng gore tshedimisetso e tlike go nyelediwa. Ke a tlhaloganya gore bo tlhoka ina bo tlike go nna teng mo mokwalong wa patlisiso ena ka go sa tlhagise tshedimisetso epe ka nna. Ke a tlhaloganya gore tshedimisetso ee tswileng mo putsisisong yame e ka tlhagelela mo patlisisong ena le go latela phasalatso fa ke letlelela mo tlase:

(Ka kopa tlhopa lebokoso le lengwe)

Ke dumalana tlhagiso kgotsa phasalatso ya tshedimisetso ee tswileng mo putsisisong yame

Ga dumalana tlhagiso kgotsa phasalatso ya tshedimisetso ee tswileng mo putsisisong yame

Ke dumalana gore putsisisong yame e ka rekodiwe

Ga ke dumalana gore putsisisong yame e ka rekodiwe

Tshaeno.....

Letlha.....

Appendix D: English/Setswana Questionnaire

A Questionnaires and Interview Schedule

African Indigenous Food Security Strategies and Climate Change Adaptation in South Africa with Special Reference to Ganyesa Village (North-West Province)

Section A: Demographic Data of Respondents

Indicate by marking an “X” in the appropriate box.

1. Age Group

20-30 years	
31-40 years	
41-50 years	
51-60 years	
61- above	

2. Gender

Female	
Male	

3. Marital Status

Single	
Married	
Divorced	
Widowed	

Cohabited	
Separated	

4. Religious Affiliation

African religion	
Christianity	
Muslim	
Others, specify	

5. Educational Level

Informal Education	
Primary	
Secondary	
High school	
Tertiary	
Others, specify	

6. Employment Status

Employed	
Unemployed	
Pensioner	
Farmer	
Others, specify	

6. Household Size

One	
-----	--

Two-four	
Five-seven	
Seven-above	

SECTION B: General Questions on Indigenous Food Security Strategies and Climate Change Adaptation

1. The Community Perspectives on the Role of Socio-Economic and Demographic Characteristics for Food Security and Climate Change Adaptation

1.1. Age group distribution

1.2. Gender

1.3. Marital status

1.4. Educational level

1.5. Household sizes

1.6. Occupational status

1.7. Religious affiliation

2. Local Community Knowledge on Food Security and Utilization

2.1. What are the main sources of food supply in the Ganyesa area?

2.2. What do community members do in terms of knowledge and skills to ensure the availability of household food supply at all times?

3. Local Community Knowledge Systems for Food Security and Climate Change Adaptation

3.1. Have you experienced any changes in climatic conditions in the Ganyesa area over the past ten years?

3.2. If the answer is yes, what are these climatic changes?

3.3. How have these changes impacted on the sources of food supply for the community and household?

3.4. What strategies do community members use to adapt to these climatic changes and ensure household food supply?

3.5. What are advantages and limitations of these food supply strategies for climate changes adaptation?

Thank You!!!!

Lenaneopotsolotso le Dipotsotherisano

Mekgwa ya go Tlhokomela Dijo wa SeAforika le Maemo a Lowapi mo Aforika Borwa go Lebeletswe Motse wa Ganyesa (Porofense ya Bokoni Bophirima)

Karolo ya A: Loago-Ekono le tsa Merero ya Divalopalo tsa Merafe

Bontsha ka“X” mo lebokoseng lele maleba

1. Setlhopa sa Dingwaga

Dingwaga 20-30	
Dingwaga 31-40	
Dingwaga 41-50	
Dingwaga 51-60	
Dingwaga 61- Legofeta	

2. Bong

Mme	
Rre	

3. Seemo sa Nyala

Gaanyala	
Onyetse	
Otlhadile semolao	
Moswelwa	
Lo dula mmogo fela	
Lo kgaogane	

4. Seemo sa Tumelo

Tumelo ya setso	
Mo Kreste	
Tumelo ya semoseleme	
Tse dingwe	

5. Maemo a Thuto

Thuto e potlana	
Sekolo se se potlana	
Sekolo se se mo magareng	
Sekolo se se golo	
Setheo se se golo	
Tsedingwe,	

6 Maemo a Tiro

Wa bereka	
Ga a dire	
Penshenara	
Molemi Rui	
Tsedingwe,	

6. Palo ya Batho ko Lapeng

Nngwe	
Pedi go tharo	
Tlhano go supa	
Supa le go feta	

Karolo ya B: Dipotso Kakaretso ka Kitso ya Setso ya Dijo le go Emelana le Dipheto go tsa Maemo a Loapi.

1. Di Kakanyo tsa Selegae ka Botlhokwa jwa Loago-Ekono le tsa Merero ya Dipalopalo tsa Merafe mo Kitsong ya Setso ya Dijo le go Emelana le Dipheto go tsa Maemo a Loapi.

1.1. Setlhopa sa dingwaga

1.2. Bong

1.3. Seemo sa nyalo

1.4. Maemo a thuto

1.5. Palo ya batho ko lapeng

1.6. Maemo a tiro

1.7. Seemo sa tumelo

2. Kitso ya Tshomarelo ya Dijo le Tiriso mo Selegaeng

2.1. Ke ditheo tsefe tsa go belana dijo mo tikologong ya Ganyesa?

2.2. Batho ba selegae ba dirang mabapi le kitso ya go nna teng ga dijo mo matlong ka nako tsotlhe?

3. Kitso ya Selegae Mabapi le Peeletsi/Tshomarelo ya Dijo le Pheto go ya Maemo a Lowapi

3.1. Ao itemogetse pheto go ya maemo a lowapi mo tikologong ya Ganyesa Mo dingwageng tse lesome?

3.2. Ga karabo ele ee ke dipheto go dife tsewa?

3.3. Dipheto go tse di amile peeletso ya dijo mo matlong yang?

3.4. Batho ba selegae ba dirisa megwa efe ya go emelana le pheto go ya maemo a lowapi le peeletso ya dijo mo matlong?

3.5. Ke ditshono le dikgwetlho dife tsa megwa e ya peeletso ya dijo mabapi le phetogo ya lowapi?

Keya Leboga!!!

Appendix E: English/ Setswana Focus Group Guide

Number of people:

Date:

Time:

Place of meeting:

Name of facilitator:

1. The Community Perspectives on the Role of Socio-Economic and Demographic Characteristics for Food Security and Climate Change Adaptation

1.1. Age group distribution

1.2. Gender

1.3. Marital status

1.4. Educational level

1.5. Household sizes

1.6. Occupational status

1.7. Religious affiliation

2. Local Community Knowledge on Food Security and Utilization

2.1. What are the main sources of food supply in the Ganyesa area?

2.2. What do community members do in terms of knowledge and skills to ensure the availability of household food supply at all times?

3. Local Community Knowledge Systems for Food Security and Climate Change Adaptation

3.1. Have you experienced any changes in climatic conditions in the Ganyesa area over the past ten years?

3.2. If the answer is yes, what are these climatic changes?

3.3. How have these changes impacted on the sources of food supply for the community and household?

3.4. What strategies do community members use to adapt to these climatic changes and ensure household food supply?

3.5. What are advantages and limitations of these food supply strategies for climate changes adaptation?

Thank You!!!

Kaedi ya Dithopha tsa Dipuisano

Palo ya batho:

letlha:

nako:

lefelola kopano:

leina la motsamaisa:

1. Di Kakanyo tsa Selegae ka Botlhokwa jwa Loago-Ekono le tsa Merero ya Divalopalo tsa Merafe mo Kitsong ya Setso ya Dijo le go Emelana le Diphetogo tsa Maemo a Loapi.

1.1. Setlhopa sa dingwaga

1.2. Bong

1.3. Seemo sa nyala

1.4. Maemo a thuto

1.5. Palo ya batho ko lapeng

1.6. Maemo a tiro

1.7. Seemo sa tumelo

2. Kitso ya Tshomarelo ya Dijo le Tiriso mo Selegaeng

2.1. Ke ditheo tsefe tsa go belana dijo mo tikologong ya Ganyesa?

2.2. Batho ba selegae ba dirang mabapi le kitso ya go nna teng ga dijo mo matlong ka nako tsotlhe?

3. Kitso ya Selegae Mabapi le Peeletsi/Tshomarelo ya Dijo le Phetogo ya Maemo a Lowapi

3.1. Ao itemogetse phetogo ya maemo a lowapi mo tikologong ya Ganyesa Mo dingwageng tse lesome?

3.2. Ga karabo ele ee ke diphetogo dife tsewa?

3.3. Diphetogo tse di amile peeletso ya dijo mo matlong yang?

3.4. Batho ba selegae ba dirisa megwa efe ya go emelana le phetogo ya maemo a lowapi le peeletso ya dijo mo matlong?

3.5. Ke ditshono le dikgwetlho dife tsa megwa e ya peeletso ya dijo mabapi le phetogo ya lowapi?

Keya Leboga!!!

Appendix F: Turn-It-In Report

African Indigenous Food Security Strategies and Climate Change Adaptation in South Africa

ORIGINALITY REPORT

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