



AN ASSESSMENT OF FOOD PRODUCTION, PROCESSING AND STORAGE AT
COMMUNITY LEVEL IN KAVANGO EAST REGION: A CASE STUDY OF NDIYONA,
MASHARE AND RUNDU RURAL EAST CONSTITUENCIES

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE
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Abstract

Food security is often defined in terms food availability, food access and food utilization (USAID 1995). Food availability is achieved when sufficient quantities of food are constantly available to all individuals within the country. Such food items can be supplied through house hold production, other domestic output, commercial outputs and commercial imports of food assistance. Access is assured when household and all individuals within them have adequate resources to obtain appropriate food for a nutritional diet. Access depends upon disposable income available to house hold.

The main objective of the study on food security was to assess and describe the factors influencing the production, processing and storage of Mahangu food at household and community levels in the Kavango East Region in Namibia. The study adopted a qualitative approach involving collection of data through observations and interviews from the study area and the inhabitants of the study area. The sample of the study comprised of 3 constituency Councillors (one from each constituency), 3 members of the Local Development Coordinating Committee (one from each constituency) and 5 heads of households from each constituency (total, 15 heads of households). Interview guides were used as research instruments to solicit information from the sample chosen. The data collected was analysed qualitatively using themes and narratives from participants.

From the findings of the study, it was concluded that food security is a major problem in the Kavango East Region due to un favorable climate, poor food production, poor food processing and poor food storage. From the findings and conclusions, it was recommended that there

should be a review of agricultural institutional policies and support that would make Kavango East a bread basket for other Regions in Namibia.

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Dedication

I dedicate this work to my good family, especially my wife Mrs. Esther Mututonde Kamutoole Mwoombola and children for their patience, understanding, love and support.

Declaration

I, Edson Wine Mwoombola hereby declare that the work contained in this thesis entitled, “an Investigation into Mahangu, production, processing and storage at the community level in Kavango East Region: A case study of Ndiyona, Mashare and Rundu Rural East constituencies is my own work and it has not been submitted before and all the sources I have used and quoted have been acknowledged.

It is submitted in the partial fulfilment of the requirements for the Master of Arts in Security and Strategic Studies (MASSS).

Edson Wine Mwoombola

Date_____

Abbreviations and Acronyms

(L)R (BR)	-	Pearl Millet (<i>Pennisetum Glacum</i>)
ADC	-	Agriculture Development Centre
AIMS	-	Agriculture Indicative Management System
AMTA	-	Agricultural Marketing Trading Agencies
ASF	-	African Swine Fever
AUC	-	African Union Commission
CA	-	Conservancy Agriculture
CAADP	-	Comprehensive Africa Agriculture Development Programme
CAC	-	Cardno Agri-Systems Consortium
CBPP	-	Contagious Bovine Pleura Pneumonia
CCAPN	-	Comprehensive Conservation Agriculture for Programme for Namibia
CGIAR	-	Climate Change Development Management by the International
CGIAR	-	International Agriculture Research Centres
COHA	-	Cost of Hunger in Africa
CPF	-	Country Programme Framework
CPF	-	Country Programme Framework
CPPISLM	-	Country Partnerships Pilot for Integrated Sustainable Land Management
CSI	-	Coping Strategic Index
DAPEES	-	Directorate Agricultural Production Extension and Engineering Services
DART	-	Department Agriculture Research and Training
DEES	-	Directorate of Extension and Engineering Services
DES	-	Dietary Energy Supply
DOA	-	Department of Aquaculture
DOF	-	Department of Forestry
DRD	-	Directorate Research and Development
DVEM	-	Directorate of Evaluation and Estate Management
ECA	-	Economic Commission for Africa
ELCSA	-	Latin America and Caribbean Food Security Scale
EMU	-	Emergency Management Unity

ENSO	-	El Niño Southern Oscillation
FANR	-	Food Agricultural and Natural resources
FAO	-	Food Agricultural Organization
FAOUN	-	Food Agriculture Organization for United Nations
FIVIMS	-	Food Insecurity and Vulnerability Information and Mapping Systems
FNSDP	-	Food Security and Nutritional Development Programme
FSIEWS	-	Food Security and Early Warning Information System
GAM	-	Global Acute Malnutrition
GAP	-	Good Agriculture Practices
GDP	-	Gross Domestic Product
HFIS	-	House Hold Hunger Scale
HIV	-	Human Immunodeficiency Virus
HPI	-	Human Population Index
HRD	-	Human Resources Development
ICT	-	Information Communication Technology
IMF	-	International Monetary Fund
IPC	-	Integrated Phase Classification
ISDP	-	Indicative Strategic Development Programme
IWRM	-	Integrated Water Resources Management
MAWRD	-	Ministry of Agriculture Water and Rural Development
MDGS	-	Malawi Growth Development Strategy
MDGS	-	Millennium Development Goals
MFMR	-	Ministry of Fisheries and Marine Resources
MLR	-	Ministry of Land and Resettlement
MVAC	-	Malawian Vulnerability Assessment Committee
NAB	-	Namibian Agronomic Board
NAFIN	-	Namibian Alliance for Improved Nutrition
NAP	-	National Agriculture Policy
NASSP	-	National Agriculture Support Services Programme
NCA	-	Northern Communal Area
NCR	-	Northern Central Region
NDP	-	Namibian Development Programme

NEPAD	-	New Partnership for African Development
NFNP	-	National Food and Nutritional Policy
NNFU	-	Namibian National Farmers Union
NPC	-	National Planning Commission
NSA	-	Namibian Statistics Agencies
PGRFA	-	Plant Genetic Resources for Food Agriculture
PPR	-	Pestedes Petitis Ruminants
RDCC	-	Regional Development Coordinating Committee
RVAA	-	Regional Vulnerability Assessment and Analysis Programme
SAFEX	-	South Africa Features Exchange
SMANN	-	Small Millers Association of Northern Namibia
SSN	-	Seed Security Network
TAD	-	Trans Boundary Animal Diseases
UNDP	-	United Nations Development Programme
UNEP	-	United Nations Environment Programme
USA	-	United States of America
USDA	-	United States Agency for International Development
USDHHS	-	United States Department of Health and Human Services
VAC	-	Vulnerability Assessments Committee
VAM	-	Vulnerability Analysis Mapping
WFP	-	World Food Programme
ZIMVAC	-	Zimbabwe Vulnerability Assessment Committee

CHAPTER 1: INTRODUCTION AND BACKGROUND

1.1 Introduction

Human beings like all other living organisms need food for survival. Food basically nourishes life by providing energy and growth and without it, hunger creeps in and signs of malnourishment such as food deficient disorders develop. Unlike other living organisms that depend entirely on the natural environment for food, human beings have through many years developed survival strategies, ideas, methods and technology for food production, processing and storage for future food security. Despite advancement in food production, processing and storage technology, food security has remained a cause of concern globally (Hammond, Brown, Burger, Flanagan, Fristoe, Mercado-Silva, Nekola & Okie, 2015). Food security is said to exist 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 (FAO, 2009). Other countries suffer insecurity for various reasons ranging from human, environmental, technological and natural disasters like drought and floods. Food insecurity is now a recognized public policy concern for food-rich countries such as the United States of America, as well as for poorer countries around the world (Maxwell & Frankenberg, 1993; USDA & USDHHS, 1994). Food security is also worrisome in Namibia as a developing country as the country is characterized by arid to semi-arid climate that acts as a limiting factor to food productivity, among other factors. It is for this reason that this study aims at assessing food security at local community level in Namibia taking Kavango East region as an area of study, focusing on three local constituencies, namely; Mashare, Ndiyona and Rundu Rural.

1.2 Orientation of the Study

The Kavango East Region stretches from Kasote Village for almost five (5) kms at the west of Rundu Urban constituency up to the Eastern boundary of the old Kavango Region at Omega settlement. The Region covers the area of 23 983.2 square kilometres. The Kavango East region is comprised of six (6) constituencies that include Rundu Urban, Mashare, Ndonga Linena, Rundu Rural East, Mukwe and Ndiyona. In terms of human index, Kavango East region now ranks as the fourth poorest region in Namibia with the Human Population Index(HPI) of 30 (PPA, 2005-6) considering that Human Poverty Index for Kavango stood at 34% in 1997, while the latest report suggests that some progress has been made in reducing poverty between 1997 and 2000. In the mid-1990s, the households in Kavango region spent more than 80% of their income on food. This was close to the national average of 8.7% but significantly lower than 25.1% (UNDP, 2015).

Kavango East Region has a population of about 139 823 with an approximate growth calculated at 0.7% by using a total population of the six (6) constituencies (Mukwe, Ndonga Linena, Ndiyona, Mashare, Rundu Rural East and Rundu Urban with a total area of 23,983km² of which 82% of the population is found in the rural areas of the region (NSA, 2011). Rundu Urban is considered as the Capital City of Kavango East Region.

In terms of livelihoods, 42% of the population of Kavango East Region was classified as rural in 2011. For the majority of the population, livelihood is based primarily on agricultural

production which constitutes the main source of income for the households. Unfortunately, according to Mendelsohn (2009), for Kavango East region, agricultural output is no longer sufficient to sustain households and income from agriculture but however is combined with other sources of income to make ends meet. Millet (mahangu) crop production has been a vital food source for the people of Kavango East Region but the methods of production, processing and storage are not fully developed.

According to the Minister of Agriculture and Rural Development, John Mutorwa(2010), essential nutrients such as vitamins from the nutritious millet (mahangu) can be used for instant porridges, which can be used to feed the patients in hospital and vulnerable members of the society. The Minister further said that millet (mahangu) marketing can be optimally developed and many of the country citizens particularly those who are living in rural areas can be empowered through rural development, job creation and poverty reduction among others. To support this, McDonough, Rooney and Serna-Saldivar (2000) mentioned that millet (mahangu) is more than just an interesting alternative to other common grains such as maize because it is a good source of some nutrients such as manganese, phosphate and magnesium. With the importance of millet (mahangu) as a staple food in Namibia, it is also appalling to know that currently no much research has been conducted on the impact of the policies and strategies initiated by the government of Namibia to improve food security among the households of the Kavango East Region.

1.3 Comparison of the Three Constituencies

Ndiyona constituency is situated on the far South East of Kavango East Region. The NSA (2011) highlighted that the population of Ndiyona is about 12 012. Rundu Rural constituency is situated in the North West of Kavango East Region, bordering Mashare constituency on the East and Kavango River on the North. The population is 22 538 (NSA, 2011). Mashare constituency is one of largest constituency of Kavango East region bordering with Ndonga Linena on the East. The population of Mashare is 16 091 (NSA, 2011).

In Kavango East region, more than half of the population is classified as poor and out of six (6) constituencies, four (4) of them are in the list of the twenty poorest constituencies in Namibia (National Planning Commission, 2015). The study, thus, investigated the methods of food production, processing and storage in Kavango East Region.

1.4 Historical Background of Millet (Mahangu)

Pearl millet (*Pennisetum glaucum*) is the most widely grown type of millet in Kavango East Region. It has been grown in Africa and the Indian sub-continent since pre-historic times. Recent Archeo-Botanical research has confirmed the presence of domesticated pearl millet on the Sahel zone of Northern Mali between 1500 and 2000 BC. Cultivation subsequently spread rapidly and moved overseas to India. The earliest Archeo-Botanist record in India dates back to 2000 BC and it spread rapidly through India by 1500 BC based on evidence site of Hallur. Cultivation also spread throughout Eastern and Southern Africa. Records exist for the cultivation of pearl millet in the United States in the 1850s and in Brazil in the 1960s (Fuller,

2003). The millet which is called (mahangu) in Namibia has different names in various regions. In some African language they call it Hausa, in Kiswahili it is named Uwele, Oka in Yoruba Nigeria, Petit in French, Masago in Somalia, Mexoeira in Mozambique, Mhunga in Shona (Zimbabwe), Inyawuthu in Ndebele (Zimbabwe), Lebelebe in Setswana, Zembwe in Ikalanga, Dro'o in Tunisian Arabic, Bulrush Millet in Australia, Milheto in Brazil, Cattai Millet in USA, Candle Millet in Europe and Bacri in India. This therefore shows that millet is found worldwide.

1.5 Statement of the Problem

Food availability and stable access to food are both critical components of food security. In the Kavango East region context and elsewhere in Namibia, the majority of the population lives in rural areas and survives from dry land crop production and livestock rearing. According to the Crop Assessment Report of the Ministry of Agriculture Water and Forestry (2011), community and household food security has been diminishing over extended periods of time despite various government interventions such as providing subsidies through dry land crop production programmes. Furthermore, National Population Housing Census (2001) confirms that more than half of the population of Kavango East region is classified as poor while out of six (6) constituencies, four (4) of them are in the list of the poorest constituencies of Kavango East region. Given the fundamental role that crop production plays in food security these statistics are worrisome. In addition, the strategic blue prints such as vision 2030, National Development Plans and Growth at Home strategy for the Namibia's economic growth articulate government commitments towards poverty reduction. In the same vein, the President of the Republic of Namibia Dr Hage Geingob has declared war on poverty and

wealth redistribution. However, there has been little research on evaluation of the impact of Government strategies in improving the food security at community and household level of a specific region and constituencies. There is also a lack of research on the evaluation and impact of Government policies and strategies in improving the food security among the community and the households of Kavango East region. This situation substantiates the need to undertake a detailed assessment of the production, processing and storage of Mahangu in Kavango East with a view to make recommendations on strategic interventions to improve food security.

The problem of food security and poverty has a serious consequence when it comes to the national security because the region and societies can be the breeding ground for instability, civil unrest, terrorism and demagogues. In the meantime food, have been at the core of the rise and fall of civilization and has toppled governments allowed dictators to prevail and spawn mass immigration.

1.6 Objectives of the Study

- 1.6.1 To identify the challenges and opportunities for the production, processing and storage of millet (mahangu) at household and community levels in the Kavango East region;
- 1.6.2 To determine food security in Kavango East region;
- 1.6.3 To assess the perception and all practices concerning Mahangu production, processing and storage at household level in the three constituencies under study; and
- 1.6.4 To recommend strategies for food security in Kavango East region.

1.7 Significance of the Study

Since food security is a global cause of concern and Namibia as a country in region of unfavourable climatic conditions cannot be spared. Kavango East region of Namibia lies in an area of moderate rainfall in comparison to the rest of Namibia and it is for this reason that it can have the potential to be the bread basket of Namibia. It is therefore, imperative to assess the status of food security in Kavango East Region to identify opportunities and challenges thereof. Once opportunities have been identified, strategies can be developed to overcome food security threats and challenges in Kavango East Region.

The study contributes to the academic body of scientific knowledge on food security in Namibia especially for students pursuing with studies on Agriculture and Food Security. Furthermore, food security policy makers including the Ministry of Agriculture in Namibia may make use of the findings of this study to addresses food security challenges facing Kavango East Region.

1.8 Limitations of the Study

The study was confined to production, processing and storage of millet food (Mahangu). It was done in three constituencies which reflected the true picture of Kavango East Region. The time allocated to the research was very limited compared to the magnitude of the subject to be analysed. Food security needs to be monitored in all the seasons to qualify the investigation or analysis. The landscape also impeded the movement of the of the research team. The Southern part of Kavango East region was sandy and it required a 4 x 4 vehicle.

Kavango East region is a home to almost seven languages and majority of the inhabitants speak Rukwangali followed by Romanyo, Shambiyu and Thimbukushu and a few speak Oshiwambo and other European languages (NPC, 2004). This resulted in language barrier during collection of data since there was no common language in the region. Finally, the study was executed in Kavango East region which is in the range of 800kms to 1200kms from Windhoek, so the researcher had to travel the long distance and put up with food, accommodation and fuel costs. The study was conducted from 21August-29August 2016.

1.9 Definition of the Concepts

Agronomic - The study of crops and plants.

Agro-Project - Any irrigation project of an irrigation farming enterprise with or without small-scale irrigation farmers units.

Anthrosols - A group of anthrosols comprising of soils that were buried or profoundly modified through human activities such as addition of organic materials or households, irrigation and cultivation.

Arenosols - Physical chemistry or a system of colloidal particles dispersed in a gas, smoke or fog.

Alimentarius - Voluntarily standards for food additives, pesticides residue, veterinary drugs and other issues that affect consumer food safety.

Biodiversity - The variety of life on earth at all levels from genes to ecosystems and the ecological and evolutionary process that sustain it.

Berchimia - Genus of plants in the family rhamnaceae named after bench botanist Berthout van Berchem.

Corcyra-Cephaloca - Is a moth of the family pyralidae. It becomes a pest it is caterpillar's feeds on the dry plant stuffs such as seeds, including cereals.

Endosperm - The tissue that surrounds and provides nourishments to embryo in the seeds of many angiosperms.

Fluvisols - Is a genetically young soil in alluvial deposits, a part from the river sediments they also occur in lacustrine and marine deposits.

Organic - Farming methods produced or practiced without using artificial chemicals.

Inorganic Fertilizers - Not consisting of or coming from any living substances.

Genetic Resources - Genetic resources are the materials upon which the world relies to improve the productivity and quality of crops, livestock, forestry and fisheries as well as to maintain healthy population of wild species.

Cropping Region - Regions where the crops are produced.

Stacks - Loads or heaps.

Mycotocins - Any toxic substances produced by fungus.

Anthropometric - The measurement of the size and proportions human body.

Pennisetum-Glaucum - The pearl millet grains of the species also called *pennisetum americanum*.

Dehulling - A milling process during which the grain coat and germ are removed from the grain.

Pearl millet - One of the major crops in the semi arid tropics of Asia and Africa and the crop favoured due its productivity and short growing season under dry high temperature conditions.

Decorticated - Removal.

Organoleptic properties - The aspects of food or other substances as experienced by senses including tastes, sight, smell and touch.

Phytosanitary - A measure for the control of plant disease especial in agricultural crops.

Vermiculture - Animal that destroy plants.

Alimentarius - The passage that carry food from the mouth to the anus.

Lactic acid fermentation - A biological process by which sugars such as glucose, fructose and sucrose are converted into cellular energy.

Larvae – development stage of an insect coming from the egg.

Pupae - Insect in the stage of development.

Numps - Where one cannot feel part of their body.

Phenolic - Poison.

Toxicity - The quality of being poisonous.

Oscillation - Regular movement between the two positions.

Pleuro-Serioun - Illness which affect the inner covering of the chest.

1.10 Organization of the Study

Chapter 1: Introduction and background of the study. The chapter consists of the introduction, background of Kavango East region, historical background of Millet (mahangu), description of three constituencies under study, statement of the problem, research objectives and questions, significance of the study, limitations of the study and definition of key terms.

Chapter 2: Theoretical Background. This chapter provides the theoretical framework of food security.

Chapter 3: Comparative studies on food security. This chapter provides comparative studies on food security focusing on global food security, food security in Africa, food security in the Southern African Community (SADC) Region and finally food security in Namibia.

Chapter 4: The Legal Framework of Food Security in Namibia. This chapter analyses and assesses the legal instruments associated with food security in Namibia.

Chapter 5: Mahangu production, processing and storage. This chapter focuses on the the Namibian local millet (mahangu), its production, processing and storage.

Chapter 6: Methodology of the study. The chapter highlights the methodology used in the study and procedures followed in collecting and processing the results. The chapter consists of the design, population, sample, research instruments, data analysis and ethical issues.

Chapter 7: Presentation and analysis of data. In this chapter the results of the findings obtained from the study are discussed. The information obtained from direct observation, document search as well as from interviewers.

Chapter 8: Conclusion and recommendations. This chapter concludes the findings of the study and provides recommendations to be considered for future studies.

CHAPTER 2: THEORETICAL BACKGROUND

2.1 Introduction

This chapter presents the theoretical background of the research study on food security. The theoretical background in this chapter reviews some theories on food security as the conceptual basis for understanding, analysing, and designing ways to investigate relationships within social systems (Jacard, & Jacob, 2010). In this respect with regard to this study, the social systems are the systems related to food production, food processing and food security. According to Swanson, (2013), theories are formulated to explain, predict, and understand phenomena and, in many cases, to challenge and extend existing knowledge within the limits of critical bounding assumptions. Therefore, this chapter provides the conceptual framework of food security and reviews the theories of food security with the purpose of explaining, predicting and understanding the phenomena of food security in Kavango east region in Namibia. The theories covered on food security in this chapter include the Nine Steps to Food Security, the sustainable livelihood theory and the Human Development and Capability Approach to Food Security.

2.2 The Concept of Food Security

Many authors such as Pérez-Escamilla (2012), Smith (2013) and Saltzman, et al., (2013) have contributed to literature on food security therefore this study looked at the studies that are

identical to the research topic. Important literature on the concept and manifestation of food security point of view is consulted.

Food security defined as a state when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO, 2008). According to Djanja, Joseph, Christie, Mike, Fazey, Loan, Hyde & Tony (2015), there is an interesting linkage of progressive connection between food security and poverty. According to McClain-Nhlapo (2004), access to enough food is in fact considered to be a human right. Generally, the concept of food security is defined as including both physical and economic access to food that meets people's dietary needs as well as their food preferences cited from World Health Organization (1996) quoted by Kolberg (2008). However, the above author elaborated further by pointing out in his classical poverty and famines that, availability of enough food in the aggregate is not sufficient for food security.

With respect to food access, Coates (2013) describes food security under five dimensions that include food sufficiency, nutrient adequacy, cultural acceptability, safety, and certainty and stability. Citing the concept of food security and environmental awareness, Smith (2013) suggests "sustainable intensification" which entails delivering safer, nutritious food from the same area whilst maintaining ecosystem service provision at the same time considering alternatives such as management of food demand and waste reduction. It is therefore, more important to develop strategies for food security starting from production through processing and then storage. The next section focuses on ways of enhancing food security.

2.3 The Nine Steps to Food Security

The Nine steps to Food Security and Combatting Hunger is a visionary theory on food security which decisively shifts away from subsistence farming to growing profitable businesses (Vision, 2015). The Nine Steps to Food Security was prepared by Kofi Annan, former Secretary General of the United Nations and a founder of Kofi Annan foundation (2015). The theory puts small-holder farmers at its heart and understands that larger enterprises also have a major part to play in tackling food security to feed not just people in Africa but turning the once starving continent into the world's agriculture powerhouse (Vision, 2015).

The Nine steps to Food Security and Combatting Hunger according to Kofi Annan Foundation (2015) are outlined below.

Step 1: The first step is how to realize the bright prospects of African agriculture where by investment in this sector has doubled in the last decade as government recognizes the crucial importance on agriculture to the well-being of the people, social, stability and economic growth. Annan (2015) indicated that it is hard to understand how the continent with 60% of the world uncultivated arable land still suffer so badly from under and malnutrition and spends N\$35 billion every year in importing food. It is stated that the role of the farmers are crucial and that government and the private sector could develop partnership and expand links with small holders and organization filling critical gaps. Furthermore, the food systems value chain and the greatest success would come from bigger farms share market access, technology and knowledge with smaller farmers.

Step 2: Is the better rural infrastructure by connecting thousands of farmers to viable road network, power grid, systems and essential infrastructure.

Step 3: Is to create an environment conducive to agricultural growth, government need to put in place institution and policies that are far sighted.

Step 4: Is the increase access to financial services for farmers and growing agri-business this will enable a farmer to acquire good seeds and use fertilizer enhancing measures to step out of poverty.

Step 5: Is the climate smart agricultural solutions can improve food security and farming resilience by increasing productivity in compared to conventional approaches.

Step 6: step to food security is, that young people and the women has both the highest Unemployment and agriculture sector is desperately in need of more labour they also need a training and technical support.

Step 7: Koffi talked about the regional barrier from tariffs to transportation cartels are restricting trade.

Step 8: give those in the agricultural sector a better access to information via mobile phone and internet.

Step 9: Increase yields without harming the environment by developing locally adapted varieties that are drought tolerant with a goal of being a uniquely African green revolution

The above Nine steps to Food Security were proposed and developed after it has been realised that hunger remains widespread and Africa is the only continent which cannot feed itself and suffers so badly from under- and malnutrition and spends \$35b every year importing food, yet it has 60% of the world's uncultivated arable land (Annan, 2015).

With regard to food security in the Kavango West Region in Namibia, the nine steps of food security can be applied to the local rural community farmers and this can shift away the local communal subsistent farmers to from subsistence farming to growing profitable agri-businesses producing food for feeding the region and the whole of Namibia.

2.4 The sustainable livelihood theory

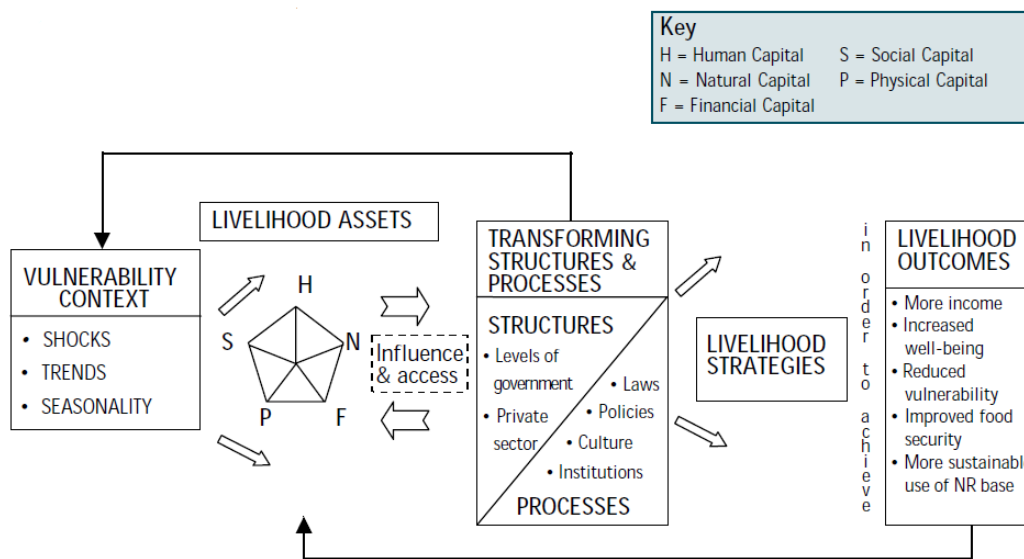


Figure 2.3: Sustainable Livelihood Framework schematic model (DFID, 2001)

The Sustainable Livelihoods Theoretical Framework is a theory often used by development agencies for planning and assessing development interventions with the focus on how people strategically use the resources available to them to forge livelihoods, and how development interventions affect the available resources and the way people interact with them. With regard to food security, the sustainable livelihood framework can be seen as one of outstanding food security assessment framework. According to Twigg and Greig (2001), a livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. Furthermore, Twigg and Greig (2001), state that

a livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base.

The Sustainable Livelihoods theoretical Framework starts with the vulnerability context in which people live their lives and the livelihood assets (in effect, capacities) that they possess, followed by the activities that transform structures for generating livelihood strategies that lead to livelihood outcomes. According to Twigg and Greig (2001), the central feature of the Sustainable Livelihoods approach is that it views people as operating in a context of vulnerability (shocks, trends and seasonality) for which the external environment in which people exist is responsible for many of the hardships faced by the world's poorest people. With regard to Kavango East Region of Namibia, unpredictable climatic conditions coupled with the general poverty of the populace makes the area and its inhabitants vulnerable to natural disasters such as droughts.

The people's strengths/capacities (coping capabilities) is in the form of livelihood assets human capital (skills, knowledge, labour, good health), social capital (social networks group membership, trust relationships and exchanges), natural capital (land, forests, water) physical capital (basic infrastructure) and financial capital (savings, access to credit, pensions, remittances). According to Bazeley (1999) the various forms of capitals are used to develop transforming structures and transforming processes (development processes) that lead to desirable outcomes (resilient capabilities).

The structures in Kavango East Region include land, forests and water that are transformed into agricultural outputs such as mahangu and other crops products. The transforming processes (development processes) include cultivation of crops on land, processing of the crop and storage of the crop yields. Therefore, the theory suggests that community members (communal farmers) must make use of the available natural assets, transforming natural assets into food products to reduce food insecurity.

2.5 Human Development and Capability Approach to Food Security

Human Development and Capability Approach to Food Security is associated with Burchi and De Muro (2012) who studied and discussed the relationship between food security and human development. According to Burchi and De Muro (2012), the relationship is strong and bilateral and it views food security as an essential element of a multidimensional concept of development.

The analysis of food security shows that the Human Development and Capability Approach to Food Security have three basic dimensions and steps that include:

- Analysis of food entitlements incorporating three sub-dimensions that include three key components of entitlements: endowments, exchange conditions and production possibilities with variables such as employment status, type of employment, assets, savings and possible claims on the state or other local institutes for cash transfer or food assistance;
- Analysis of basic nutritional capabilities associated with being free from hunger, intended as the capability to have enough food/calories, being in a good health, being

educated, and being able to take part in household decision making and community life; and

- Analysis of the capability to be food secure, which allows a more comprehensive examination of the food security phenomenon by adopting coping strategies for their long-term food security.

With this approach to food security, it is possible to move beyond income, entitlement, or livelihoods-related frameworks, and to identify the root causes of food insecurity (Burchi & De Muro, 2012). According to Burchi and De Muro (2012), food insecurity can be the result of lack of education, health or other basic capabilities that constitute people's wellbeing.

2.6 Summary

This chapter described the theoretical concept of food security and presented the theoretical framework of food security citing three theories of food security namely the Nine Steps to Food Security, the sustainable livelihood theory and the Human Development and Capability Approach to Food Security. From the three theories cited, it can be summarized that food security in a particular region or area can be achieved through making use of the available assets (or resources) transforming them into productive processes for food production and eventually developing coping capabilities to reduce vulnerability in times of food crisis or environmental disasters that might disrupt food security.

CHAPTER 3: COMPARATIVE STUDIES ON FOOD SECURITY

3.1 Introduction

This chapter provides comparative studies of food security. It starts by looking at global food security cascading down to food security in Africa and then food security in the Southern African community region where Namibia is found. Finally, the chapter makes a close analysis of food security in Namibia.

3.2 Global Food Security

At the introduction of the literature review chapter we mentioned that many authors on the food security will include local and global authors and one of them at the global level is Professor Celoustus Juma from Harvard University in the USA. Juma (2010), in his book entitled “African can feed itself” added that the key elements in the transition to food security are the use of technologies including modern biotechnology and investments in geographical sciences for the improved natural resources management, the continuation of expansion of basic infrastructure, telecommunication, transport, energy and irrigation. Juma (2010) further emphasized on the improvement of technical education, especially for women and provision of experiential education, creation of enterprises especial in the fields such as seed production, farm mechanization of trading practices that extends to regional markets, close co-operation between government, industry, academia and involvement of civil society in policy formulation and implementation. The use of improved seeds through biotechnology he says it could dramatically increase farm yield.

3.3 African can feed itself and help to feed rest of the world

Zachary (2013) published any article concerning the continent that Africa can feed itself and can help feed the rest of the world. Zachary (2013) highlighted ten reasons why Africa can feed itself and help to feed the rest of the world and the first reason is that, Africa is the most rapidly urbanizing region in the planet, while it may seem like counter intuitive; farming is now good because is not only profitable, but it becomes popular and; even the educated and well off, who long shunned getting their hands dirty, now extol farming as a path to property. Nigeria's former president Olusegun Obasanjo has combined progressive farming, practices.

Third, international demand for Africans is soaring; global prices for African cocoa, cotton, and even green beans are at historic highs. Cocoa the key ingredients for chocolate, commands double of what it did in the 1990s, high prices have boosted the living standard of millions of African farmers, and especially the most well organized enterprises.

Fourth, the lost crops of African have been long ignored; Africa forgotten crops are including cassava, sunflower seeds, and cowpeas which in last decades rapidly expanded in production bringing unexpected benefits. Outside often miss the real action in African agriculture by ignoring important staples that are growing the region but not well known elsewhere. Juma (2010) highlighted that technology is boosting profits, and in any African market, even in the tiniest village there are farmers text messaging on their cell phone, linking buyers and sellers, making it easier to disseminate important information like the market prices and better planting and harvesting techniques and so forth.

African farmers use modern technology in the world, so any up stick in usage could lead to enormous gains. Zachary (2013) stressed that the most important technologies in farming are irrigation and fertilizers, and yet both are largely absent in Africa and cost is the major reason. In addition, Zachary (2013) acknowledged that in much of the Sub-Saharan, fertilizer costs two to three times more than anywhere else in the world, largely because of the shipping costs of imported ingredients and that irrigation schemes, that are practically non-existent and transport links are terrible. Women are getting better educated, and that will lead to better farm outcomes.

In Sub Saharan Africa, improvements in the education of women make them better farmers which matters, because women produce up to 80% of the food region. Climate change has harsher environments will force farmers and their counterparts around the world to work smarter and make long term investments that they should be making. In starving off doom, they will actually be building a more sustainable future. Africa World War II, a starving Europe, it is farm ruined by the most destructive conflict in a human history, leaned heavily on growers south of Sahara. Wheat from Kenya, Maize from Zimbabwe, and Fruits and Vegetables from Western and Southern Africa adorned Europe tables. Africa farmers prospered, and by early 1960, they supplied 8% of the world's tradable food (Zachary, 2013).

3.4 Southern African Development Community (SADC) Agriculture and Food Security

At the beginning of the chapter the research mentioned that the literature review will be composed of global, continental, regional and local authors and researchers which are relevant to the Namibian situation and in particular Kavango East Region. The SADC

addresses the agriculture and food security issues within the region by focusing on the five key issues and the key issue is if food security in Southern Africa is sustainable, access to safe and adequate food at all times, poverty eradication, drought and chronic disease can result in food system failures or chronically inadequate nutrition and making food security a top priority within the Southern African Development Community (SADC).

SADC has developed a concept that staple food availability, food access, nutritional value and safety are important aspects of food security. It is highlighted that food availability means there is consistent local supply of appropriate food types either imported or produced locally. Food access means that the local population has the means to purchase or barter food they require for appropriate diet and nutrition. Available and accessible food must also be of sufficient nutritional value and be safe to consume if food security is to be attained. There should be also a stable supply and access to food for longer periods. This can be achieved with appropriate food production, handling and storage.

SADC is of the opinion that the natural and human-made disasters can affect food security. Disaster preparedness addresses adverse conditions that reduce food availability, including droughts, and prolonged dry spells, floods, cyclones, or wild fires, pests and disease, policies adversely affecting agricultural input prices seeds, fertilizers, agrochemical, civil unrest, human and wild life conflicts. Additional on SADC review is the Dar-es-Salaam declaration on agriculture and food security.

The declaration on Agriculture and Food Security in the SADC Region addresses the devastating effects of HIV/AIDS on human health and the linked impact on agricultural production. SADC seeks the development of a competitive agricultural sector through;

improved access to agriculture inputs, including seeds, fertilizers and other agrochemicals, promotion of draught, power and appropriate equipment for tillage, controls on disease and improved crop storage and handling, development of drought tolerant crops and improved fish stocks management, processing and handling. The other issue on SADC approaches to food security is the Regional Indicative Strategic Development (RISD) plan implementation framework. SADC monitors international food prices and is concerned with the impact of food price increases of some commodities and fluctuation in global cereal stocks. In recent years increases in food prices have been exacerbated by demand for food crop for use in bio fuels rather than human or lives stock consumption.

The SADC Region has been less affected by external market factors than it might have been due to positive local food crop production making the region less susceptible as whole. Several programmes to address food security are implemented by the food, Agriculture and National Resources (FANR) Directorate, this include the development and operation of Agricultural Information Management System (AIMS), crop production, and Livestock sector unit. SADC has designed the agricultural information management system (AIMS) and is designed to provide early warning of imminent disasters, asses' vulnerabilities, monitor weather patterns and provide an integrated database for use in food security planning for SADC region. SADC further conducted an analysis of Agro-metrological and satellite remote sensing data through crop-growing seasons to support early warning activities. A remote sensing tool has been developed to monitor environmental changes and provide reliable satellite-based food security information. SADC provides food security bulletins, agro-meteorological updates, and seasonal outlooks through its agriculture information services.

According to SADC a regional early warning system provides advance information on food crop yields and food suppliers and requirements. The information alerts member states and stakeholders of impending food shortages/surplus early enough for appropriate interventions. National Early Warning Units are established in all member states to collect analyses and disseminate early warning information at the country level. And a regional Vulnerability Assessment and Analysis Programme (RVAA) focuses on strengthening national and regional vulnerability assessment and analysis systems through institutional support, training and capacity-building and working closely with regional partners, SADC responds to both short and long term food security constraints within a frame work of monitoring, analysing and addressing the broader context of poverty and livelihood vulnerability.

SADC's response to food insecurity is not restricted to emergency relief measures or agricultural programmes; it is framed within a long-term comprehensive effort to understand poverty and vulnerability. SADC works with other regional networks, such as the Southern African Regional Poverty Network, which is active in addressing, maintaining and enhancing crop production and it offers the Southern African Development community (SADC) region opportunities for accelerated economic growth, food security and increased trade, and it has the benefit of strong linkages with other sectors of the economy.

According to SADC to realize it is full potential, the full crop production sector requires improvements in the new farming technologies, seeds fertilizers, agro-chemicals, marketing infrastructure and information, to harmonize policy, strategy and capacity for coordination. Furthermore, measures to mitigate the effects of recurring, serious, and often multi-year droughts must be implemented. These identified obstacles offer intervention on hotspots for

the purpose of attaining regional food security. The crop development unit of agriculture and natural resources (FANR) Directorate is charged with promoting the production and protection of crops within SADC region. Currently approximately 25% of the Southern African region is used for arable crops, but only 5% is under cultivation.

The Regional Indicative Strategic Development Plan (ISDP) identifies key areas of production that could be enhanced, including agricultural intensification through expansion of the area under cultivation, irrigation, mechanization, sustainable use of fertilizers distribution and better seed quality and distribution. Seed security is a precursor to food security because availability and quality of seed set the limits for crop production and productivity. To assist in these aims, the crop development unit of food, agriculture and natural resources directorate manages programs such as (SADC Seed Security Network), which seeks to improve access and availability of high quality seed in Southern Africa region. Its primary goals are to improve food security through increased seed security and to increase disaster preparedness.

Historically, weakness in SADC region seed systems have led to inadequate distribution of quality seed, especially to small-scale farming operations, adversely affecting food security. A major achievement of the Seed Security Network (SSN) has been the development of the SADC common systems for seed variety release, including sanitary and phyto-sanitary seed certification. Certification protects importing nations from bacterial contamination and pests. Recurring natural disasters such as drought, floods, cyclones and civil conflicts have complicated seed security efforts. Furthermore, the imports and exports of seeds between member states have been complicated by legislative barriers. The fragmented nature of seed legislation is a concern and SADC is attempting to address through its interventions.

Harmonised seed legislation between the member states will greatly improve seed and food security in the region. The Seed Security Network focuses particularly on the need of resources- poor, small- scale farming efforts. While some specific goals of the network include harmonization of seed regulations and policies to improve seed movement and trade, dissemination of seed information, determination of training needs and providing capacity building through training, and establishment of effective procedures for seed interventions in the case of disasters. The other partnership is the plant genetic resources working in close collaboration with the SADC Seed Security Network, the SADC Plant Genetic Resources Centre and it is National counterparts maintain plant genetic resources for long term and immediate use, with conserve and guarantee crop and wild plant resources, document plant resources, ensure their efficient and sustainable use train personnel and coordinate regional activities and provide for the exchange of information, including scientific, cultural and traditional and indigenous knowledge.

Lastly on the plant genetic resources center it addresses some of these goals through the plant genetic resources inventories, in situation farm conservation and Ex-situ conservation at SADC and national plant genetic resources center, responsible directorate, food agriculture and natural resources center, services and institutions, SADC trade hub, Information Services. SADC and agricultural information data base; Livestock is important natural resources for Southern Africa Region, with over 60% of the region's total land area suitable for farming, contributing significantly to food security across the Southern African Development Community (SADC) Region. The farm animal resources of SADC are rich and

immensely diverse, with livestock population in SADC estimated at 64 million cattle, 39 million sheep, 38 million goats, 7 million pigs, 1 million horses and 380 million poultry.

Traditionally, these farm animals are source of food, skins, fertilizer, traction power, medicine and other raw materials for the population of the region. An estimated 75% out of the above livestock population is kept under smallholder traditional farming systems. Although livestock production offers the SADC region an opportunity for accelerated economic marketing infrastructure, poor market access of livestock productivity lack of efficient and effective animal disease control, lack of marketing infrastructure, poor marketing access of livestock products, together with lack of availability of information, and other product and associated factors hinder the region from achieving its goals of being self-sufficient in livestock products. Another source of food which can make contribution to food security in the SADC region is fisheries. While Southern Africa is prone to water scarcity, which can result in crop failures, fisheries can be reliably managed in all tonnes of the fish drawn from oceans, lakes and reservoirs and river every year.

SADC member states also benefit from Aqua culture (Farmed fish). The significance of the above figures can be seen when they are compared to the estimated 2,5 million tonnes of fish caught from the African continents inland water, and over 5 million from marine areas in 2010 (Food and Agriculture Organization of the United Nations, 2010). Fisheries programmes within SADC are managed through the Food, Agriculture and Natural resources (FANR) Directorate, and Guided by the protocol on fisheries (2001).

3.5 Comprehensive Conservation Agriculture Programme for Namibia

Further literature consulted was the comprehensive conservation agriculture programme for Namibia in 2015-2016 developed by the Ministry of Agriculture, Water, and Forestry. The Ministry has identified Conservation Agriculture as a core element of strategy for sustainable crop production that follows ecosystem services. As a result the MAWF has introduced Conservation Agriculture (CA) as an essential crop production system for enhancing the production of crops and livestock, livelihood and the quality of life of farmers across the country. According to MAWF assessment, the Agricultural sector in Namibia needs to grow by 4% a year to meet the food requirements for the growing population. However, they stressed that the expansion of cultivated areas to compensate for low yields, the exploitation of low nutrients status without restoration of soil fertility, changing climatic patterns, including low and erratic rainfall, and the lack of well adopted technologies have been identified as some of the major challenges of soil fertility in Namibia. Therefore the conservation, maintains of soil fertility are essential to improve the efficiency of inputs used while achieving increased productivity.

The article further states that food security relies not only on higher production and access to food but also on the need to address the destructive effects of Agricultural production practices on environment. It will increase the resilience of production practices to the effects of climate change. The MAWF has concluded that agriculture in Namibia will address the problem of low and erratic rainfall through the use of practices that reduce water losses and increase infiltration and low soil nutrients status by increasing soil carbon and nitrogen through the use of organic soil cover and legumes in rotation.

The population of Namibia is projected to be 2.2 million to 3 million by 2031 with the majority located in the northern regions of Omusati, Oshana, Ohangwena, Oshikoto, Kavango East, Kavango west and Zambezi. The projected increase in population is expected to put pressure on agriculture land that would further decrease farm size and agricultural production per house hold. And the estimation is that nearly two-thirds of the population in Namibia lives in rural areas majority depending on smallholder crop production as a means of livelihoods and survival. However, the livelihood is threatened by recurrent seasons with low production, or even crop failures low or variable production levels and declining crop yields can often be attributed to inappropriate farming practices and management.

Some current farming practices are environmentally unsustainable and lead to land degradation according to Comprehensive Conservation Agriculture Programme (CCAPN) for Namibia supported technical by Food and Agriculture Organization of the United Nations (FAO). These include mono-cropping without adequate soil nutrient replenishment, the burning or removal of crop residues and the frequent disturbance of the topsoil by ploughing and disking.

The comprehensive agriculture (CA) assessment has also highlighted that the subsistence-based small holder sectors in Namibia is also very vulnerable to climate change variability. Subsistence farmers are highly dependent on weather patterns and climate change that will increase this exposure and reduce yields and income even further.

Climate-change scenarios predict increased atmospheric temperature, with a mean annual temperature increase for Southern Africa of 2.5 to 3* by 2050 in conservative estimate.

Rainfall variability is likely to increase, resulting in a higher frequency and intensity of extreme events, such as drought and floods. According to conservancy the new way of farming is needed to counter and reverse land degradation and to adapt to climate change variability, while ensuring national food security. Conservation Agriculture (CA) is one of such approach. The Conservation Agriculture is an approach to manage agro-ecosystems for improved and sustained productivity and food security while preserving and enhancing the resource base and the environment. The (CA) is characterized by three linked principals' namely continuous minimum mechanical disturbance, permanent organic soil cover, and diversification of crop species grown in sequences and or associations.

The (CA) is practiced in conjunction with other Good Agriculture Practices (GAPs) for increased and established yields, reduced production costs (labour, machinery, fuel fertilizer) climate change adaption and a mitigation, reduced conservation. Some complementary (GAPs) are timeouts farm operations, use of improved seeds, targeted applications of mineral and organic fertilizers and integrated pest management. The principals of (CA) are valid for all Namibia crop production systems and all levels of mechanization, although varying techniques and practices apply in varying circumstances. Plan (NDP4) has deliberately decided to implement (CA) and Conservation Agriculture is a new approach among many of the farming households in Namibia. Due to generally long periods of adaptation and associated risks, the farming households need capacity strengthening including material support to adopt Conservation Agriculture.

3.6 Food Insecurity and Public Health

Food Security exists, at the individual, household, national, regional, and global levels when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for a healthy and active life (FAO, 2001). Food insecurity can be chronic food insecurity or transitory food insecurity. Chronic food insecurity is long-term or persistent food insecurity closely related to structural deficiencies in the local food system or economy, chronic poverty, lack of assets and low incomes which persistently curtail food availability and access over a protracted period of time (DFID, 2004; FAO, 2005). On the other hand, transitory food insecurity is a sudden onset, short-term or temporary food insecurity that refers to short periods of extreme scarcity of food availability and access brought about by climatic shocks, natural disasters, economic crises or conflict (Barrett & Sahn, 2001). Food insecurity in Namibia is more of transitory food insecurity associated with recurring drought as a natural disaster. However, chronic food insecurity in Namibia can also be a result of general poverty.

At the household levels and individuals levels, poverty can prevent adequate access to food and can lead to food poor choices and unhealthy diets. Poverty at household or individual level can affect other determinants of food utilization, sanitation and health care. Within any given country poverty can affect food security at one level but not at the other, such as when poor households experience food insecurity in countries that have adequate food availability at the national level, or conversely when food-secure households and well-nourished individuals exist in countries with low food availability. Given the central role that poverty plays in threatening food security, long-term solutions to reducing food insecurity invariably

involve poverty reduction. For example, eradicating extreme poverty and hunger are combined into a single millennium Development Goal; and decrease in country poverty rates is one of the two highest-level indicators of feed the future (Feed the Future 2013). However, reducing poverty does not necessarily improve food utilization; for example, the silent hunger of micronutrient under nutrition can persist even in affluent households (von Braun et al., 1989, Herth et al., 2012).

3.7 Achieving Food Security in the face of Climate Change

This literature is about how to achieve food security in the face of climate change it is developed by a group of professors and academics and it is summary for policy makers from the commission on sustainable agriculture and climate change. The professors and academics started by saying that the global interconnection of food system will bring us food security and environmental sustainability. Several converging threats from climate change, population growth and unsustainable use of resources are steadily intensifying pressure on humanity and the world governments to transform the way food is produced, distributed and consumed. On the planet with sufficient food for all billion people go hungry. Another billion over consume, increasing risks from chronic diseases. The food system faces additional pressure as the global population grows, to around 9 billion by 2050 and as diets shift towards higher consumption calories of fats animal products.

Food insecurity afflicts communities through the world whenever poverty prevents assured access to food supplies as well as causing widespread human suffering; food insecurity

contributes to degradation and depletion of natural resources, migration to urban areas and cross borders, and political and economic instability.

Inefficiencies in food and supply chains have a negative impact on the environment, lower productivity and waste of food. Current farming practices including land clearing and inefficient use fertilizers and organic residues make agriculture significant contributor to green house on the planet. From the farm gate to consumer, refrigeration and other supply chain activities are additional sources of greenhouse emissions. As global demand for food, fodder and bio energy crops grow crops; many agricultural systems are depleting soil fertility, biodiversity and water resources. In the regions there are large gaps between potential produce 20 million to grain, are lost to land degradation adding to the billions of hectares that are already degraded. It is estimated that a third of food produced for human consumption is lost or wasted across the global food system.

It is clear that our collective choices related to agriculture and food systems must be revisited. Our climate is changing and given the levels of greenhouse gases are already in atmosphere, and it will continue to do so, extreme weather events, such as high temperature, drought and floods are more frequent and have dire social, economic and ecological consequences. Ever high average global temperature is likely without dramatic change in greenhouse gas emissions across a wide range of human activities. In coming decades global climate change will adverse overall effect on agriculture production and will bring us toward, and perhaps overcritical threshold in many regions areas are currently suffering from food insecurity are expected to experience disproportionately negative effects on reduce the effect of climate change on food supplies, livelihoods and economics, we must greatly increase adaptive

capacity in agriculture both to long term climatic trends and to increasing variability as an urgent priority.

In 2007/2008 food price rises shocked many policy makers from the belief that stable or declining food prices and assured supplies could be taken for granted. Before the price spike, poverty meant that that 800 million people were hungry (FAO 2010). Following the price spike, the number increased to a little billion people arise that set a significant set of back progress towards the UN Millennium Development Goal to halve the proportion of people suffering from hunger between 1990 and 1925. It is estimated that a additional 44 million people have fallen into extreme poverty due to rise in food prices since June 2010 (HMG 2010). These events have drawn increased attention to the fact that a significant proportion of humanity remains chronically undernourished, even during periods of relatively normal prices and low volatility.

CHAPTER 4: THE LEGAL FRAMEWORK OF FOOD SECURITY IN NAMIBIA

4.1 Introduction

The previous chapter provided and presented comparative studies on food security. This chapter focuses on the legal framework for food security in Namibia. The legal framework components in this chapter include the Namibian Constitution, the National Agricultural Policy of Namibia, the Green scheme policy for Namibia, National Food and Nutritional Policies (NFNP), the Regulations and Quality of Mahangu under the Agronomic Industry Act of 2004 and the Harambee Prosperity Plan (HPP, 2015). This provides the base of how food security is treated legally in Namibia and how the legal framework provides for the enhancing food security in Namibia.

4.2 The Constitution of the Republic of Namibia

The Constitution is the supreme law in Namibia. It protects the basic rights of all people and guarantees that there will be equal rights for all. The Constitution explains how Namibia will be governed as through the establishment of the parliament, office of the president and other important government position. It also sets up courts of law which enforce and protect the rights of all people in Namibia and No one is allowed to violate the rights that the Constitution protects.

Article 5 of Chapter 3 of the Constitution of the Republic of Namibia emphasized on the protection of Fundamental Rights and Freedoms. One of the fundamental rights is access to

resources that are vital in enhancing the living of people. Article 6 of the same chapter (Chapter 3) of the Constitution of the Republic of Namibia puts emphasis on the “Protection of Life” and states that the right to life shall be respected and protected (Republic of Namibia, 1990). With regard to the impact of food insecurity on human life, it means that the right to life has to be protected. Finally, Article 95 of the Constitution of the Republic of Namibia requires the state to actively promote the welfare of its people. The welfare of people is enhanced by their livelihood and being free from food insecurity and its impacts. This is supported by Article 5, Article 6 and Article 26 in the same Constitution of the Republic of Namibia.

4.3 National Agricultural Policy of Namibia

On the 5th of July 2005, the Namibian Cabinet resolved that pearl millet (Mahangu) should become a controlled product under the Namibian Agronomic Board act 20 of 1992. Pearl Millet (Mahangu) was gazetted to be a controlled crop under the Namibian Agronomic Act of 20 of 1992, published in the Government Gazette of 15 May 2008. The commercialization of Mahangu was in line with what was highlighted in the National Policy (1995) which positions the commercialization of Pearl Millet strategy that can alleviate poverty and improve the standard of living of small scale farmers in the Northern Communal Area of Namibia.

The Ministry of Agriculture, Water and Rural Development (MAWRD) and the Namibian Agronomic Board (NAB) over the years targeted increased productivity and the promotion of commercialization of Millet (Mahangu). The targeted efforts involved the stimulation of local production of mahangu and sorghum, improving post-harvest and draught animal power

technology, generic promotion of Mahangu and Sorghum, the dissemination of market information as well as market facilitation.

These included but were not limited to the promotion of mahangu grain and flour (raising demand), information and training programmers for small millers, improved of small millers mahangu flour packaging and improved Mahangu grain standards (NAB, 2004). Further efforts aimed at positioning commercialization amongst small farmers have included information dissemination, informal trade brokerage, promotion of small scale commercial milling services and campaigns to encourage small scale producers to market their produce through cooperatives (NNFU, 2003), and (NASSP, 2004, cited in Musaba and Muzanima, 2009).

The Agricultural production of Namibia characteristics according to Policy of Agriculture is the scarce of productivity land and fragile soils, coupled with limited water resources and erratic rainfall regime are the principal features of Namibia agriculture. And the country can be divided into four ecological zones which is the desert region, comprising of 22% of the land area, where mean annual rain fall is less 100 mm, then there is the arid region, comprising of 33% of the land and the annual rainfall varies between 100 and 300 mm, next is semi-arid region, comprising 37% of the land area, where mean annual rainfall lies between 301 and 500 mm and lastly the semi-humid and sub-tropical region, comprising 8% of the land area, where mean annual rainfall is between 501 and 700 mm. Very little has been done to understand the Millet (Mahangu) consumer. Little is documented on the perceptions, attitudes and preferences of mahangu consumers in Namibia. Very little is also being done to preserve indigenous knowledge in the last remaining pockets of African societies found in Namibia. The reliable crops production under rain fed conditions is only possible in areas

receiving an average of over 400mm rainfalls annual, representing 34% of the country. Within those areas, crop production is further limited by scarcity of productive soils. Some 97% of the soils have a clay content of less than 5% and only approximately 1% or 820,000 hectares of the land area has soils with a medium to high potential for rain fed or irrigated arable production. Presently, the Northern communal areas, an estimated 274,000 hectares are used for rain fed production by 134,000 farm households cultivating an average of two hectares of land per households.

Approximately 25,000 hectares are used for rain fed crop production in the Otavi-Grootfontein Tsumeb maize triangle commercial farming area, while a further 6,500 hectares are being used for commercial irrigated crop production by commercial farmers in other parts of the country. The agricultural sector is divided into a commercial farming-sector, where farmers operate on freehold title deed land, and communal farming sub-sector, where farmers operate on land operated under a communal tenure system. The communal areas directly support 95% of the nation farming population but occupy only 48% (33.5 million hectares) of the total agricultural and farmers in communal farming. Sub-sector are mainly engaged in subsistence farming and it is only in the rain fed cropping and extensive livestock production characterize by extremely low productivity and that is the situation in Kavango East Region.

4.4 Green scheme policy for Namibia

The theoretical frame work shows how the government of Namibia has introduced the green scheme policy in commitment to increase agriculture production including agri-business. The policy as per cabinet decision no. 22nd/25.08.2003 was critically reviewed during the year

2008 following the identification of shortcomings within the then existing green scheme policy. The policy thus addresses the shortcomings and is intended to ultimately increase Namibia's food production capacity for both domestic and export markets. The farming models identified will create an enabling environment for increased food production through irrigation on both commercial and communal land. The policy also seeks to support individuals with access to irrigation water to increase output through special incentives.

The revised policy defines specific farming structures, based on public-private partnership, with regard to the state developed agro-projects, and it is hoped that through such a model, Namibia will see an increased synergy between Government and private sector for investments' in agro-projects. In addition cereals storage infrastructure has been developed for strategic food reserves. These facilities will assist in making cereal markets readily available to farmers, in the process of implementation the policy, the Government will put in the place cold storage facilities to stimulate the production of fruits and vegetables for domestic and export markets. The cold storage and marketing infrastructure will include sorting, packaging, processing, branding and distributions networks. The implementation of the programmes also creates opportunities for private sector participation.

Lastly, the formulation of this policy is also guided by Namibia regional and international commitments. These include instruments such as comprehensive Africa agriculture Development programmes of the African union and new partnership for Africa's Development. The green scheme policy also highlights the objectives designed to achieve the intended target such as: To increase agriculture production and sector contribution to GDP; to promote investment in food production for agro industry, to mobilize private and

public capital for investment in agriculture, to promote food security at the National and household levels; to diversify agricultural production and products for the domestic and export markets, to promote research and adaptation of technology to increase productivity, to promote value addition, job creation, to promote skills development and transfer of technology.

After the objectives there is also the implementation strategies of the green scheme which are to increase the existing irrigated agricultural areas to full potential; the identification of potential areas for agricultural irrigation; development of agro-projects at identified areas for irrigation, development of storage facilities and marketing infrastructure; mobilization of public and private capital; capacity building to ensure productivity and competitiveness; research and development, technology transfer and adaptation; implementation of agricultural land and water resources, last diversification of agricultural crops and export promotion. The other scenario is the state development in communal areas where the Ministry obtains the Land Board in terms of leasehold or occupational land right, develops the land rights or jointly with a private sector, and the land is utilized by irrigation farmers under lease or profit-sharing agreements with the Ministry.

A small scale irrigation farmer component will be included irrigation land developed by the state, and the commercial enterprise qualifies for incentive as described in the green scheme incentive brochure. Under this arrangement, the commercial irrigation farmer or commercial enterprises is obliged to render services to the small-scale irrigation farmer component as a service provider. Small scale irrigation farmers who excelled in farming in the state agro projects at the expiry of their contracts will be assisted and supported to acquire their own

land for farming. Such farmers who qualify will be assisted in accessing finance for agricultural inputs, plant, machinery and marketing.

Again in the policy of green scheme there is commercial irrigation development in communal areas include which states that the option is for farmers who have a land allocated to them by the traditional authority and who and wish to engage in irrigation commercial farming. Before any development on this land can commence, the green scheme implementation unit needs to assist the farmer to apply for leasehold from the local land board, as per act of 2002.

Irrigation farmers who want to develop between 20 hectares and 30 hectares will be assisted in terms of the green scheme, with the provision of seeds, fertilizers, patricides and marketing as described in the green scheme incentive brochure while the irrigation farmers who develop less than 20 hectares will not be assisted under the green scheme, but would be assisted under the National horticultural programme or any other programme rendered by the Ministry.

4.5 National Food and Nutritional Policies (NFNP)

Lastly in the literature review is the list of policies developed to tackle the national food policies and nutritional policy (NFNP) that if implemented correctly food security and nutritional policies will be realized and these policies are twenty in total and it starts with the 1995 National Food and Nutrition policy and the purpose was to improve the nutritional status of the population, taking into account the policy initiatives in other sectors, particularly in health and agriculture with specific objectives to improve the quantity and quality of food

consumed by the population with the aim of ensuring an adequate diet for all. To empower house hold to use resources available to them to improve childcare, feeding practices and their environmental sanitation to provide an adequate level of social and supporting services. Lastly, in this first policy is the identification of three key areas which must be addressed to purposefully and meaningfully to address the underlying causes of food insecurity and mal nutrition in Namibia (1) improving household level resources (2) improving knowledge, attitudes and practices (3) improving social and supporting services.

The second policies is the 1995 National Agricultural Policy (NAP) and the aim is to ensure food security and improve nutritional status, create and sustain viable livelihood and employment opportunities in rural areas and improve the living standards of farmers and families as well as farm workers. The agricultural sector should contribute to economic growth, poverty alleviation and sustainable natural resources management.

Third, is the Agricultural Land Reform Act no. 6 of 1995 which provides the legislative basis for the acquisition of land by the state for the purposes of resettling Namibian citizens who do not have any adequate agricultural land and who have been socially, economically and educationally disadvantaged by the past discriminatory practices. The act is an important prerequisite for food and nutrition security for many rural families.

Fourth, is the National Resettlement Policy (2001) aimed to redress the past unequal land distributions to disadvantaged Namibians. The policy provides a strategic frame work for land reform and resettlement in Namibia. The fifth is Communal Land reform act of 2003 which provides guidelines and regulations for acquiring and distributing land in communal

areas through land boards and recognized traditional authorities. Sixth are the Land Valuation and Taxations Regulations as provided by the agricultural (commercial) Land Reform Act 6 of 1995 set out the basis for land evaluation and taxation for Commercial agricultural land in Namibia. It provides for the evaluation of unimproved site value of commercial farm land factors to be taken into consideration during valuation the appeal process and the sitting of the valuation court.

Seventh is the Property Values Profession Act 7 of 2012. The act provides for the establishment of the Namibian Property Values Profession Council. The envisaged council will oversee the registration of valuation professionals and set up standards in line with international acceptable norms. Eighth, is the Cooperative Act of 1996. It mandates the MAWF to promote the development of the cooperative movement. The Multi-purpose cooperatives are relevant to the farming community because they provide for the following components: savings and credits agricultural inputs supply and farm produce marketing and consumer good supply. Ninth, National Horticulture Development Initiative (2002) which promotes increased local production and marketing of fruit and vegetables and other horticultural products. The Mahangu and sorghum actions plans updated in 2004 and it have similar objectives of promoting commercial production and marketing.

Tenth, is the Green Scheme Policy (2008) which aims to increase Namibia's food production capacity for both domestic and export market through irrigation on both commercial and communal land. The policy promotes an increased synergy between Government and the private sector for investments on agro projects. In addition it focuses on development of cereals storage infrastructure for strategic food reserves and cold storage facilities to

stimulate the production of fruits and vegetables for domestic and exports markets. Eleventh, is the National Small Stock Development Plan (2004) which is a coordinated approach to the development of the small stock sector to increase its contribution to the national agricultural output, to ensure agricultural value-adding and improved balance of trade. Number 12, is the Marine Resources Policy of (2004) which describes the state of Namibia marine resources and fishing industry and states the principals governing Namibia's marine resources policy. The aim is to allow the exploitations of the inland fish resources on a sustainable basis at optimum level. Thirteenth is Aquaculture Policy of (2004) which is responsible and sustainable development for aquaculture to achieve socio-economic benefits for all Namibian and secure environmental sustainability.

The fourteenth is the Forest Development Policy (2001) and its main aim of this policy is to provide a general direction for the management of Namibia's forest resources. The policy states that forestry should play a key role in the contribution to sustained food production and therefore be closely integrated with other rural sources of livelihood such as animal husbandry and farming in order to improve nutrition in the country.

The fifteenth is the Water Supply and Sanitation Policy (2008) which pledges to ensure availability of essential water supply and sanitation services to all Namibians at affordable costs. The sixteenth is the National Water Policy White Paper (2008) which provides for a policy frame work equitable, efficient and sustainable water resources management and services towards integrated management of Namibia's water resources with participations of all Namibians. Seventeenth, Water Resources Management Act (2004) aims to harmonize the management of water resources in the country within four distinguished important

subsectors: irrigation, rural water, urban and industrial mining. Eighteenth, is the Policy of Environmental Management Act (2007) and the objectives of this policy is to prevent and mitigate the significant effects of activities on the environment by ensuring that the significant effects of activities on the environment are considered in time and carefully, ensuring that there are opportunities for timely participation of interested and affected parties.

Nineteenth, the policy of Disaster Risk Management (DRM) which sets out the National Disaster Risk Management System for Namibia comprised of the National Disaster risk Management committee, (DDRM) of OPM, Regional Disaster Management committee, local authority disaster risk management committee and the Namibian vulnerability assessments committee. Number twenty, National Gender Equality Policy (2010-20). The aim and purpose of the Gender Equality Policy is to achieve equality and empowerment of both female and male persons in Namibia. The policy frame work aims to serve the following purposes, to provide mechanisms and guidelines for all sectors and other stakeholders for planning, implementing, and monitoring gender equality strategies and programmes in order to ensure effective strategies for gender equality and women empowerment.

Lastly is the Drought Policy (2010) with eight objectives such as ensure the house hold food security is not compromised by drought, to encourage and support farmers to adopt self-reliant approaches to drought risk, preserve adequate reproductive capacity in livestock herds in effective areas during drought periods, ensure the continuous supply of potable water to communities and particularly to the livestock, minimize the degradation of the natural resources base during the droughts, enable rural inhabitants and agricultural sector to recover quickly following the drought, to ensure that the health status of all Namibians is not

threatened by the effects of drought, and finance drought relief programmes efficiently and effectively by establishing an independent and permanent National Drought Fund. The policy aims to shift responsibility for managing drought risk from government to the farmer with financial assistance and food security interventions only being considered in the event of an extreme disaster drought being declared.

4.6 Regulations and Quality of Mahangu under the Agronomic Industry Act, 2004

The Ministry of Justice and the Agronomic Board of Namibia has found it necessary to regulate the composition and quality Mahangu under section 24 of the agronomic industry act, 1992 Act No. 20 of 1992. The regulations apply to Pearl Millet (Mahangu) flour or meal for human consumption and the regulations do not apply Pearl Millet (Mahangu) flour or meal processed in the service mills and homemade Pearl Millet (Mahangu) products by dehulling of Pearl Millet (Mahangu) grains.

To go further in details, the general quality requirement of Pearl Millet (Mahangu) products include the following: A commercial Mahangu miller must ensure that the Pearl Millet are safe and suitable for human consumption, mahangu must be prepared from Pearl Millet (Mahangu) grain properly cleaned of impurities, they should be free of filth and are not hazardous for human health, they are free of living insects but not limited to worms, larvae, pupae, nymphs or adults, they are sound merchantable quality free from abnormal flavor and odor, show no signs of molding, rancidity and quality deteriorations which make them unfit for human consumption and are free of contaminants, including but not limited to heavy metals, pesticide residue and mycotoxins as well as not hazardous to human health. If an

Inspector is performing his or her duty function in terms of Section 13 of the Act and is of the opinion that the Mahangu product does not comply with the requirement of sub-regulations (1), he or she must take samples of such Pearl Millet (Mahangu) product for purposes of analysis under Regulation 13.

The second regulation is the moisture of Pearl Millet (Mahangu) products when is time for packaging. According to the Agronomic industry Act 2004, it was that when packaging Pearl Millet (Mahangu) in a commercial Mahangu miller must ensure that the moisture may not exceed 14% as determined on a wet weight basis and when de-hulling Pearl Millet (Mahangu) grains are de-hulled completely as possible in order to reduce crude fibre content fat and oil content contained in the grains to significantly lessen tannins and phenolic materials contain in the grain envelopes in the meantime de hulled Pearl Millet (Mahangu) contain virtually no sand, soil particles and other parties.

Third is the pure Pearl Millet (Mahangu) flour or meal in order for it to qualify as pure Pearl Millet (Mahangu) flour or meal under these regulations, the grain may contain a limited amount of other edible grain which are of the same size as Pearl Millet (Mahangu) grain. It was stipulated in the regulation of the Agronomic Industry Act 2004, that pure Pearl Millet should be prepared taking into consideration the following conditions: Mahangu grains may contain a limited amount of other edible grain which are of the same size as Pearl Millet, it must be already present in the raw Pearl Millet (Mahangu) grain during the process of milling and it must not be removed from the Pearl Millet (Mahangu) grain using mechanical grain pre-cleaning operations.

The other edible grains contained in the pearl millet (mahangu) grain may not exceed five percent. If any other grains present have been intentionally mixed into the Pearl Millet (Mahangu) grain. If it happens that the Inspector is performing his or her function in terms of Section 13 of the Act and is of the opinion that the Pearl Millet (Mahangu) and flour or meal does not comply with the requirements of sub-regulations, the Inspector must take the samples of such Pearl Millet (Mahangu) product for the purposes of analysis under Regulation 13. The last condition on pure Pearl Millet is that when the Mahangu flour or meal referred to in sub-regulation which does not qualify as pure Pearl Millet flour or meal under that sub-regulation must be labelled as a blend or a mixed Pearl Millet (Mahangu) product and the composition of such Pearl Millet (Mahangu) products must be marked and labelled in percentage on the packaging on the packaging of the Pearl Millet (Mahangu) product in accordance with Regulation 12 of Agronomic Industry Act of 2004 .

The following paragraph is about the classification of pure pearl mahangu flour or meal and for the purpose of the regulation the flour or meal is classified in two classes: That is fermented Pearl Millet (Mahangu) flour or meal which have a maximum ph level 5.0 and unfermented Pearl Millet (Mahangu) flour or meal which have a minimum ph of 6.0 and lastly unspecified Pearl Millet (Mahangu) flour or meal which have a PH level measuring between 5.0 and 6.0. A Mahangu Miller who intends to produce or process a fermented pearl Millet (Mahangu) flour or meal must do so by applying a non-alcoholic fermentation to the product after de-hulling, followed by the drying and milling of the product which results in a flour or meal.

4.7 The Harambee Prosperity Plan (HPP) 2016/17 - 2019/20

The Harambee Prosperity Plan (HPP) is an acceleration plan or a targeted impact plan aimed at significantly reducing poverty, reducing inequalities and uplifting the standards of all Namibians (Republic of Namibia, 2015). The idea behind HPP is derived from the Kiswahili word “Harambee” which means, “Pull together in the same direction” and has been deliberately selected to call for unity and encourage Namibians to work towards a common purpose (Republic of Namibia, 2015). The HPP complements the long-term goal of the National Development Plans [NDPs] and Vision 2030.

With respect to food security whose impact of hunger is stimulated by poverty and food insecurity, Chapter 5 of the HPP under Social Progression declares that “no Namibian should die of hunger during and after the Harambee period” (Republic of Namibia, 2015). This declaration is constitutional as it supports and compliments Article 6 (Protection of Life) of the Constitution of the Republic of Namibia (Republic of Namibia, 1990). Citing the 2015/2016 drought is to provide humanitarian assistance through ongoing food distribution to affected households.

With respect to food security, the HPP advocates for improved agricultural output through efforts at improving agricultural output in communal areas to support food security at household level that will include:

- Subsidization to purchase farm implements and seeds and strengthening of agricultural extension services.

- Expansion of the Green Scheme to improve food security at both household and national levels during the Harambee period.
- Debushing as a strategy for increasing grazing land in order to improve productivity and create employment will continue to be encouraged and supported.
- Increased crop production through establish fertilizer mixer plants in Namibia during year 2 of HPP to make fertilizers available to farmers at affordable prices.

Therefore, the HPP supports the constitution and other Disaster Management legislations on protection of life and provision of short-term and long-term strategies for drought disaster resilience.

CHAPTER 5: MAHANGU PRODUCTION, PROCESSING AND STORAGE

5.1 Introduction

The previous chapter presented the legal framework which provides guidelines for food security in Namibia. This chapter focuses on mahangu production, processing and storage from household level up to national level. The main concepts covered in this chapter include the background of mahangu, supply chain of mahangu, processing of mahangu and storage of mahangu.

5.2 The Background of Mahangu Sub-Sector in Namibia

The literature here gives the back ground of the agriculture sector in Namibia that despite Namibia being one of the driest countries in the world, the Agriculture remains the central to the lives of the majority of the population as it supports over 70% of the country's population directly and indirectly, it contributes about 7% to the national Gross Domestic Product (GDP).

Namibia's Agriculture sector is dominated by livestock farming followed by crop farming. The difference between the two sectors was huge in the 1980s but reduced significantly since 1996. Crop farming contributed more to the GDP than livestock farming between 2001 and 2005. Farming in Namibia is divided into three subsectors as private, commercial farming relatively well developed and export oriented, government farms comprised of about 15 irrigation schemes and communal farming (subsistence-based, high-labour, low-technology

and input). There are approximately 4,000 commercial farms occupying about 44% of farmland of which 3000 are white owned. The communal sector comprised of about 170,000 households (NSA, 2015) occupying about 38% of the total farming area in Namibia. Due to dryness of the country, cereal production is limited to subsistence's dry land production of pearl millet, maize and sorghum in the Northern Communal Areas (NCA) comprising the north central region-NCR-Omusati, Oshana, Ohangwena, and Oshikoto, Kunene Region, Kavango East and West Regions and Zambezi while commercial production of maize mainly white Maize, Wheat, Pearl Millet and rice occur in large scale farms and irrigated schemes around the country.

Cereals contributed 14% to the Gross Agricultural production of which pearl millet grown in (NCA) accounted for 64% (Mendleson, 2006) Government and private sector in the pearl millet sub-sector. Pearl millet known as Mahangu is preferred grain staple grown by majority of small scale farmers primarily under subsistence rain fed cultivation systems on communal land in the seven NCA to limiting extend, it is grown in some parts of Otjozondjupa region, and by some commercial farmers mainly in the Tsumeb-Grootfontein-Otavi area known as (Maize triangle).

The crop is highly adopted to low rain fall and the prevailing soil conditions in these regions. Low and sporadic rains during early season adversely affect grain formation (CAC, 2010). For many years, small-scale farmers have survived on the low yields generally obtained from Mahangu (FAO). The crop is the back bone of the economies of rural households in the (NCAs) and is a staple food for at least 60% of the Namibian population. The most common

size of production land of production land unit in NCAs ranges between 1-5ha per household, but some operators, especially the wealthy influential households, cultivate at least 20ha.

The producers were 53% male and 47% female (NSA, 2015) based on the headship of households, however, women are usually the main producers even in married households though culturally the husband is recognized as the producers. Moreover women contribute about 60% of labour in the food supply chain compared to 40% by Men (Hange et al, 1999).

The demand for pearl millets products is reported to exceed the supply over the years in Namibia (Lucas, 2010). The best period for Mahangu grain trading is between August and December in the north central region and between October and December in Kavango regions (Mallet & du Plessis, 2001). The reason is that mahangu farmers have surplus or have to replace old mahangu grain with new ones at this time.

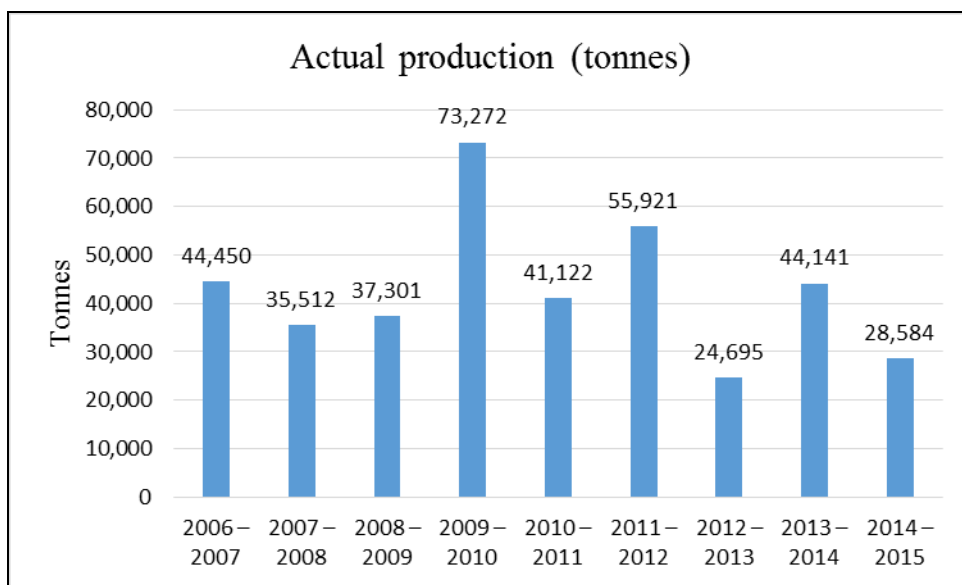


Figure 5.1: National mahangu production in Namibia, 2006 to 2015 (Namibian Agronomic Board, 2016).

According to Figure 5.1 above, the national mahangu (millet) production in Namibia is variable and fluctuates in response to frequent droughts. The fluctuation of mahangu production means a threat to food security in times of drought hence the need for reliable storage in times of surpluses.

Surplus Mahangu grain is regularly traded although in relatively small quantities compared to overall productions, which is mainly consumed. In the NCAs exchange of mahangu grain in the small quantity to traders, relatives, or neighbours for cash, as gift or in barter is still a common practice. This is a kind of exchange to urban mahangu consumers. The quantities (volume) traded vary according to good year of harvest, but even in years of global deficit some grain is traded. Rural households sell surplus mahangu grain after threshing, winnowing and cleaning or from storage to villagers (neighbours), traders, small and large millers and national food reserve facilities are managed by AMTA.

It is important to note that farmers prefer to sell older grains from their stores while the market demands for new grains. According Cho (2011) in the Post-Harvest Assessment Report he stated that mahangu farmers can also deliver their mahangu to small scale commercial millers while millers sometimes initiate the process by buying mahangu grains on consistent basis for milling and selling as mahangu mills. In the meantime they said both the formal and informal markets are important for trading of mahangu grain.

Farmers currently sell their surplus mahangu grains through AMTA to the government to fill up national reserve storage (silos) facilities using the nearest ADC and other identified collecting centers in rural areas. From national food reserves (silos) mahangu grains is sold to

millers and serves poor households as drought relief through the Emergency Management Unit.

According to assessment of Mahangu subsector in Namibia stated that the private sector involvement in the processing of Mahangu in Namibia is undertaken by small, medium and large processing plants (millers), such as Kamalanga Mills, ABC Mills and Okavu Mills, Namib Mills (Mallet & du Plessis, 2001, NAB,2013, Thomas & Mpofu, 2013).

Namib Mills, the largest industrial processor of grain in Namibia buys Mahangu grain during the marketing season. In 2000, Namib Mills launched meme Mahangu (the meal contains an undisclosed quantity of maize meal, probably around 20% which is also traded by retailers (Mallet & du Plessis, 2001).

Namib mills depots are equipped with pre cleaners and mahangu grain was bought at N\$3504 per tonnes after cleaning in 2014. Domestically Namibia is not self-sufficient in terms of mahangu production and some tightly controlled importation of mahangu grains is done by the government from India following a formal market.

The Namibian Agronomic Board (NAB) issue permits to Millers to import mahangu according to appropriate standards as per guidelines. The NAB proscribes and collects permit fees and imposes levies of 1.4% per tonnes grain marketed on the producers and 0.95% per tonnes milled on the millers (NAB, 2014).

Relatively the quantities of mahangu, mainly for the house hold consumption, are also brought by relatives from Angola. It is important to note that sometimes the grain from Angola also end up in the Namibian informal Market (Thomas & Mpofu, 2013). For 2013/14 season around 3863 tonnes were imported (NAB, 2014). Mahangu was gazetted as a controlled crop by the Namibian under the Namibian Agronomic 20 of 1992 no.465.This means that in principle, the Namibian border is closed for Imports.

The rationale to protect domestic produce from the fierce competitive threat from cheaper imports and the mahangu markets are well regulated by the government while the price of mahangu is determined by producers and millers in the industry taking into the cost of production based on Safex pricing. According to Lucas (2010) the Mahangu price at the national reserve (Silos) will be the same as the price paid to the farmers at collection center provided the mahangu stored in silos is not more than 18 month old never the less, the quality standards of mahangu grains traded is specifically not well articulated and farmers are not well informed for example grading, sorting, and packaging standards as important marketing functions need to be improved.

Various stakeholders in the value chain of the crop play significant roles to make sure that the mahangu farmers grow enough grain for both household food security and commercialization of surplus. The government has recognised the potential for mahangu growing shortly after the independence and it has promoted its production over the years. A number of documents and analyses describing mahangu production and post-harvest techniques and related issues have been produced for wide circulation (Satta, et al., 2003). Due to high production costs experienced by farmers, the government introduced the dry land crop production programmer

(MAWF, 2010) which subsidizes land preparation services, procurement of fertilizers, weeding services and seeds, these seeds are multiplied by DRD through research stations, selected farmers and green schemes. They are distributed through ADCs and seed cops. In addition, loans are made available to farmers for agricultural activities (inputs, implements, training and services) by the Agricultural Bank of Namibia (Agribank). The main challenges for Agribank remain on how to overcome the issue of collateral security.

5.3 The supply chain of Mahangu

The supply chain of mahangu is mainly based on the communal area production especially the Northern regions and some imports mainly from India. Although the imports from India can be critical in drought years, it usually is of less significance economically and socially nobody is employed at the Namib Mills solely for mahangu milling. The major mahangu producing regions and subsistence, rain-fed cultivation systems are Omusati, Oshana, Ohangwena, Oshikoto, Kavango East, Kavango West and Zambezi and they are all of high economic and employment opportunity significance with the exception of Zambezi Region where maize is of more importance.

With respect to Kavango East Region, rain-fed cultivation systems are mainly cultivation of cereals that include maize, sorghum and pearl millet (mahangu) of which mahangu dominates in most constituencies of Kavango East Region. According to the Namibia Early Warning and Food Information Unit of the Directorate of Planning and Business Development in the Ministry of Agriculture, Water and Forestry (MAWF), the Namibia Meteorological Services

depiction of a trend of above normal rainfall give prospects expected agricultural production in Kavango East Region as shown in Figure 5.2 below.

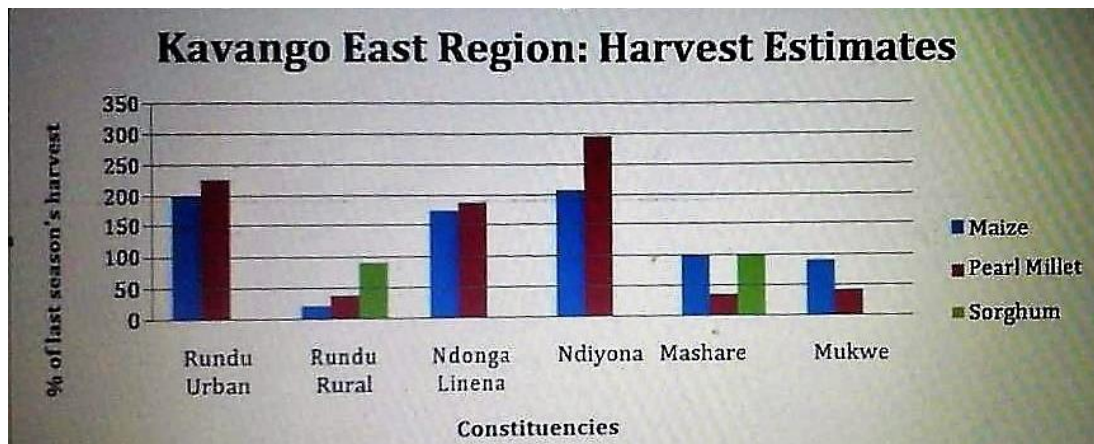


Figure 5.2: Cereal harvest estimates in the Kavango East Region, 2016/2017 (Ministry of Agriculture, Water and Forestry, 2017).

The expected harvest in Figure 5.2 above is above the average production and is reported to be significantly higher than the last seasons (MAWF, 2017). The expected improvement brings the much needed relief to the ailing household food security in Kavango East Region.

On the household food security, the situation was reported to have weakened as most households are reported to have depleted their last season's poor harvest and are now dependent on the market purchases and Drought Relief Food Programme for food supply. However, the situation is expected to improve as from March this year when some seasonal green produce such as green maize, cowpeas, melons, squashes, etc. become available and ready for consumption till main harvest in May.

However, the communal farmers in Oshikoto region cultivate much larger mahangu fields and regular surplus producers, thus it was selected for this assessment. Moreover, it was said that they are more leading farmers in Oshikoto Region who are willing to take up new

technologies as well as initiatives for commercialization of mahangu. Whereas the main products in the supply chain are mahangu grain (hulled and de hulled/decorticated and mahangu flour) plain and fermented. mahangu is mainly consumed as thick porridge (Oshifima) made from the mahangu flour.

The flour can also be used to make thin porridge (Okatete), mixture of both fermented and unfermented non-alcoholic drink (Oshikundu), fermented and plain flour based products such as pancake (Oshikuvila) and uncooked flour mixed with sour milk (Olumbololo). The grains can also be consumed as boiled decorticated grain (Onona).

The post-harvest processing of mahangu includes: drying in the field, harvesting (cutting), drying homestead (at the drying place known as Oshipale), threshing and winnowing, storage, transport of surplus to the millers, milling (large scale for formal markets and service milling for home consumptions/local retail and marketing and these important post-harvest activities at small holder producers in rural areas of Oshikoto are predominantly carried out manually by women and children and often time consuming and labour intensive.

5.4 Mahangu as a staple food

Pearl Millet (*Pennisetum Glaucum* (LR. BR.)) is a staple food and provides a major supply of food and constitutes a major supply of energy and protein to large number of people living in Africa and Asia. There are several components to estimate grain and food quality such as visual quality, nutritional quality, including digestibility, milling and processing

characteristics, cooking and keeping quality, consumer acceptability and storage stability (Maiti, Wes Chebeling, 1997).

The Nutritional quality of millet grain directly related to it is chemical composition. The Pearl Millet (Mahangu) grain is an important source of energy in the form of starch but it can also contribute to significant amounts of fibre, minerals and other nutrients to the diet.

5.5 Pearl Millet Processing in Namibia

5.5.1 Traditional Milling

The objective of milling is to achieve the anatomical separation of the pericarp, the germ and the endosperm, as well as to reduce the endosperm into fine particles (Barrion, 2008). Traditional Pearl Millet is hand-pounded using a pestle mortar, by women into flour (Mallet & du Plessis, 2001; Natanga, 2006; Barrion, 2008).

The milling process in Namibia involves decortification, steeping (fermentation) and reduction of the grain to flour (Natanga, 2006). The decortification process involves removal of the material common known as bran (pericarp and germ) with the primary function of improving the palatability of the flour and storage quality of flour (Taylor, 2004 in Natanga, 2006; Barrion, 2008). The second stage involves reducing the endosperm into fine particles (Taylor & Dewar, 2001 in Barrion 2008). During the two stage milling process certain nutritional losses occur due to the removal of the pericarp layers and germ, where most of the micro and micro-nutrients are found in high concentrations (Barrion, 2008) and increase the

palatability by removing in the aleurine layer (found between the endosperm and the pericarp) responsible for the bitter taste caused by polyphenols (Tannins) found mainly in the aleurone layer (Mallet & du Plessis, 2001).

Mallet and du Plessis (2001) identified the following as the major processing steps present in traditional milling of Pearl Millet. These are winnowing and screening grain, de-hulling, fermenting, first pounding into flour plus sieving, second pounding plus sieving, and finally drying at flour. Natanga (2006) gives decortication as the first step steeping (lactic acid fermentation), the drying of decorticated and steeped grain, milling the decorticated and steeped grains into flour and last drying of the flour. Barrion (2008) gives step as conditioning the grain, decortication, steeping (lactic acid fermentation), sun-drying and pulverizing (reducing grain into flour).

5.5.2 Industrial Milling of Mahangu

Industrial dry milling process for mahangu in Namibia consists of several processes, within these processes the use of complex continuous systems of precision roller mills sifters and air operations: 1) conditioning (tempering), 2) de-cortication, 3) roller milling, 4) sifting and 5) purification (Barrion, 2008). During the conditioning process the grains are placed in steeping bins and water is poured onto them (Barrion, 2008). It is important, to note at this stage that the grains do not go through the lactic acid fermentation process (steeping) which is the key in the traditional milling process.

5.6 Pearl Millet Storage in Namibia

The harvested and processed pearl millet (mahangu) is stored as on-farm storage or off-farm storage. On-farm storage sometimes known as household storage is the form of traditional storage in facilities or granaries called omaanda (mahangu storage round baskets huts on legs – see appendix v). On-the-farm storage in traditional ways is mainly storage for future consumption or waiting for sale. Compared to the North Central Regions where traditional mahangu storage is mainly in granaries called omaanda, in Kavango East Region mahangu storage is done in a variety of storage containers, mopane storage basket and structures including granaries made of earth blocks or poles and mud, raised on a low platform and roofed with thatch (Keyler, 1995). On-farm storage losses can be a result of mahangu storage moth infestation pest causing masses of grain to be held together by webbing (silk) produced by the larvae (Keyler, 1996). On-farm physical losses in grain weight occurs due to longer storage periods (NRI, 1997).

Off-the-farm storage is done by the government and some millers such as the Namib Mills. In order to counter the threat of food shortages at national level, the Government of Namibia has constructed its own strategic food reserves with the aim of storing grain procured from local producers or sourced elsewhere, in cases when local producers are unable to supply (Oshili 24, 2017). In the Kavango East Region, there are the Rundu silos (see Appendix vi) that can store from 4000 tonnes to 20 000 tonnes (Oshili 24, 2017). These act as strategic mahangu storage facilities for regional and national food security with minimum losses due to pests and physical deterioration.

CHAPTER 6: RESEARCH METHODOLOGY

6.1 Introduction

It is essential to collect relevant and up to date information, even more important is to collect primary information. This chapter highlights the research methods used in the study and procedures followed in collecting and processing information. This chapter discusses on the research design of the study, research population, study sample, research instruments, data analysis, ethical issues and gender issues.

6.2 Research design

Leedy and Ormrod (2014) highlight that a research design provides the overall structure for the procedure that the researcher follows and the data collected and analyzed by the researcher. The study was qualitative in nature. The case study qualitative method is concerned with understanding the processes and cultural contexts which underlie various behavioural patterns and is mostly concerned with exploring the participants in their natural setting (Maree, 2011). The advantage of exploring the participants in their natural setting is that they feel comfortable and flexible to share information with the researcher. Qualitative data collection has been applied so as to collect appropriate data necessary for in-depth analysis and understanding of factors influencing the implementation and effectiveness of existing policies on food security in the Kavango East region.

The study is an assessment of mahangu production, processing and storage at the community level in Kavango East Region. A descriptive, case study research method was used, since it attempts to provide a complete and accurate description of the situation. Stake (2013) asserts that a case study is a holistic inquiry that investigates a contemporary phenomenon within its setting.

Similarly, Stake (2013) describes a case study as being concerned with how and why things happen, allowing the investigation of contextual realities and the differences between what was planned and what actually occurred. The primary advantage of a case study according to Saunders, Lewis and Thornhill (2011) is that it provides much more detailed information than what is available through other methods, such as surveys that allow presentation of data from multiple methods (surveys, interview, document review and observation).

6.3 Research Population

Welman, Kruger and Mitchell (2005) define the research population as the study of object that consist of individuals, organizations, human product and events or conditions which they are exposed to. In the context of this study, the population of this study included all inhabitants or members in the three constituencies namely: Rundu rural, Mashare and Ndiyona in Kavango East Region. There are about 50,641 people living in the three constituencies (NPC, 2012).

6.4 Study Sample

Akpo (2006) defined a sample as a subject of the total population, which exhibits the characteristics of the population that it represents. In the context of this study, the sample was comprised of 3 constituency Councillors responsible for the three constituencies under study (1 Councillor from Ndiyona, 1 Councillor from Mashare and 1 Councillor from Rundu East), 3 members of the Local Development Coordinating Committee (LDCC) of each constituency and 5 heads of households of each constituency, making them 15 heads of households. All in all, a total sample of participants was 21. The sampling technique of the study was purposive. Maree (2011) defines purposive sampling as an approach where sampling is done with a specific purpose in mind. The specific purpose in this study was to investigate the mahangu production, processing and storage at the community level in Kavango East region.

6.5 Research Instruments

Since the study was qualitative, the study made use of the following results collection instruments and techniques to collect the desired data:

Desk information review: Is where the review of existing policy documents and guidelines on food security was done to access the secondary sources.

Interview guide: Was done to collect information on the public insight and practice at household levels as well as policy implementation and government support available at constituency level.

Appropriate interview guides consisting of open ended questions with probing options were developed to facilitate the collection of specific data related to the above. Neville (2007) highlights that an open questions have spaces left for the respondent's own answer and view or opinion. The interview process employed the use of a recorder to help with transcribing the data and ensuring that quality information was captured.

6.6 Data Processing and Analysis

According to Welman et al. (2005) data analysis is the process of bringing order to give structure and meaning to the collected data. Qualitative data analysis was used to generate findings upon which the conclusion and recommendations are based. The interview responses were coded according to themes contained in specific texts, which included beliefs, experiences and opinions that the respondents communicated. Coding is used to transform the information into numerical data that can be analyzed by means of statistical methodology (Neville, 2007). Coding data is the formal representation of analytical thinking. The responses were assigned numbers and then handed over to the statistician for data entry, processing and analysis using the Microsoft Excel spreadsheet. The data processing and analysis was done after careful considerations of the objectives of the study as well as of the tools developed to meet objectives. Graphs and percentages were used to analyze the data.

6.7 Research ethics

Welman et al. (2005) indicate that research ethics concern the researcher's responsibility to be honest and respectful to all individuals who are affected by their research studies or their reports of the study's results. They further argue that researchers are governed by a set of ethical guidelines that assist them to make proper decisions and choose proper action.

The study obtained ethical clearance from the University of Namibia (UNAM) and Kavango East Regional Council. In remote areas, especially in Kavango East region participants were more sensitive to politics and sometimes did not know how to differentiate between politicians, political party agent and any strangers other strangers since food security is a sensitive topic when it comes to households and the community in general. To counter this, the purpose of the research was explained to the participants and the researcher introduced himself. Key members were assured of confidentiality of the information that was collected by explaining that the information was only used for academic study purposes. Confidentiality was maintained on the information provided by the participants. During the completion of the interview guide, the participants were not influenced in any way to provide answers that would support the perception of an individual or that of the researcher's opinion. Consent was reached between the researcher and the key members. Through this, the key members easily answered the questions confidently.

6.8 Gender issues

Gender issues were taken into consideration in this study because some of the households were headed by women and some of the activities were influenced by the gender roles and activities, cultural and traditional value and agriculture activities of which are divided along the gender lines. In Kavango East Region men plough, weed and prepare winnowing and storage areas, while women plant, harvest, winnow the grain and store agriculture product. In the dry season, both men and women pursue non-agricultural activities.

The study also took into consideration all gender based disparities and sensitivities when dealing with the study subjects and data collection tools to ensure that all gender-based and traditional protocols were observed to minimize gender based bias, victimization and all violation of human rights during the entire process of the study.

6.9 Procedure

The main procedure in conducting this research project was to have Ethics Permission Paper from the supervisor and the coordinator of the course from the Ministry of Defense Dr V. Mwange. The guaranteeing of days of the researchers was from 21 Motorized Infantry Brigade Infantry Brigade (Unit) Ministry of Defense (MOD) and permission from Kavango East Regional Council to access the councillors, Local Development Coordinating Committee (LDCC) of each constituency and households of each constituency.

Before the study started or initiated, the research exercise in constituencies or village, interviews were arranged well in advance but due to drought problem, people changed their schedule to suit their needs because of the volatile situation brought up by the current prevailing situation in the constituency for example, when the researcher went to Ndiyona constituency the Councillor was on his way to other villages to fulfill his duties on drought relief programmes. The research team was composed of the principal researcher, an assistant and a transcriber.

CHAPTER 7: PRESENTATION AND ANALYSIS OF DATA

7.1 Introduction

Food insecurity results from various factors such as governance and a lack of institutional support. Food insecurity can be transitory when it occurs in times of crisis, and seasonal or chronic when it occurs on a continuous basis. Most often, food insecurity affects the normal distribution of food to countries, regions, households and individuals. Indeed, worldwide there is currently plenty of food but the poor are still food insecure (FAO, 2008).

The results of the findings obtained from the study are discussed in this chapter. The information was obtained from direct observation, document analysis as well as from the interviews which were used in the study. Lastly, the chapter highlights the main lessons learnt from the investigation.

7.2 Differences between Ndiyona, Mashare and Rundu Rural East Constituencies

7.2.1 Rundu Rural East Constituency

Rundu Rural East is a peripheral of Rundu Town which is the capital or administrative town of the region. A lot of the inhabitants have immigrated and are living in the surroundings of the Rundu Urban Town in pursuit of better living standards and services offered in the town. Historically, people in Rundu Rural East settled and are still settling where water and soils permit farming, creating a pattern of unevenly distributed settlements within the region with

nearly three quarters of the population living near the Kavango River (Kudumo & Silvester, 2016). More settlements were established away from the rivers, and developed due to a lack of open arable and grazing land along the river on which they could farm. The provision of water from boreholes and the opening of roads also allowed people easier access to unsettled areas (PPA, 2005-6).

The establishment of the cattle posts by wealthier farmers with large cattle herds further expanded into small villages (Mendelson, 2006). However, the living conditions in small remote villages away from the River and the main Trans Zambezi Highway are difficult because of little access to services and limited participation in the retail and cash economy. As a result, many of the villages have shrunk, often causing local public services such as schools to become redundant economically (Mendelson & Obeid, 2006).

Rundu Rural East is 1.068.7km extended at a mean density of 8.78 persons per km. The population of Rundu Rural East is about 9,381 people and only 190 households have access to safe water (NSA, 2011). Rundu Rural East is one of the Namibia's twenty poorest constituencies in the country.

7.2.2 Mashare constituency

Mashare is the largest constituency of all the constituencies of the Kavango East region. Mashare constituency is 9.140.2 km extended at mean density of 1.7 persons per km. Mashare has the largest population of all the three constituencies under study estimated to be 15.688 (Population Census, 2001). Mashare is situated on the East of Rundu Urban bordering

Kavango West on the South West, Ndonga Linena on the East and Otjozondjupa region on the South.

Majority of the inhabitants of Mashare are living in small villages away from Kavango River which is the life line of Kavango East Region (PPA, 2005-6). The living conditions of most of the Mashare people are difficult because of little access to services and limited chance of participating in the retail and cash economy, as result the villages have shrunk. The inhabitants of Mashare constituency are living in cluster villages forcing them to have their mahangu fields far from them.

The boreholes and the opening paths allowed people easy access to unsettled areas. In Mashare, the establishment of the cattle posts by wealthier farmers with larger herd of cattle further expanded into small villages of which some are not the inhabitants of the region (Regional Poverty Profile of Kavango Region, 2005-6).

Namibia Labour Force Survey (2001) highlighted that looking at the Mashare constituency inhabitants aged 15+, 42.4% were male and 38% were women. In 2011 male were 57.1% and female 54.8% (NPC, 2015). Literacy: the level of literacy in Mashare, which is referred to the ability of both reading and writing a language, is 67% (NSA, 2011). Lastly, Mashare is also in the list of Namibia's twenty poorest constituencies in the country (Poverty and Deprivation, 2015). The economic activities of Mashare constituency are mostly built on subsistence farming consisting of crop production and livestock rearing.

The infrastructure: The northern parts of the constituency are reasonably accessible with the Trans Zambezi Highway and district road traverse in the northern part of the constituency. However, the southern part of the constituency has very little access and is also where the SSCFs are located. Electricity distribution, like the rest of the region is poor and mainly found along the river and the Trans Zambezi Highway. In Mashare constituency, electricity provision is limited to the north of the Trans Zambezi Highway with no distribution to the south of the road.

7.2.3 Ndiyona Constituency

Ndiyona constituency is situated at almost 100km from Rundu Urban constituency to the East bordering Ndonga Linena on the West, North of Kavango River and North-East of Mukwe constituency. The constituency is 5.230.95km at the mean rate of 1.82 persons per km.

The population of Ndiyona constituency is estimated to be 9.551 people (NSA, 2014). The percentage of the population aged 15+ participating in the labour force, between 2001-2011 recorded that male were 35.2% and female 28.7% while in 2011 old delineation male were 62.5% and 61.1% for female (NPC, 2015). On the level of literacy which is referred to the ability to both read and write language, Ndiyona has 73% literacy rate (NPC, 2015). Ndiyona households without access to safe water are about 55%.

Economic activity found in Ndiyona constituency is mostly related to tourism and conservation as well as subsistence farming consisting of crop production and livestock rearing. In terms of conservation and community-based natural resources management the

constituency accommodates the Khaudum National Park, George Mukoya Conservancy, community forest and Maduva Nyangana Conservancy. The constituency has only two non-gazetted SSFs located in the northern part of the constituency.

Infrastructure in the northern part of Ndiyona is also reasonably accessible with the Trans Zambezi Highway traversing it, but the southern part of the constituency has poor access with only one road going down to the Khaudum. However, some new roads are in the pipeline which will improve access in the area to the south of the Trans Zambezi Highway, North of the Khaudum National park. Electricity distribution in Ndiyona is better than in the western neighbouring Ndonga Linena with the main distribution lines found along the river and the Trans Zambezi Highway but with more distribution lines to the south of that road.

7.3 Similarities between Ndiyona, Mashare and Rundu Rural East Constituencies

The similarities of the three constituencies which constitute the case study of research are as follows: Rundu Rural, Mashare and Ndiyona constituencies are all in the list of twenty poorest constituencies of the country (Poverty and Deprivation in Namibia, 2015). All the three constituencies are bordering Kavango River at the North which is the life line of Kavango East region. In the three constituencies, the condition of people at the North of Trans Zambezi Highway is better than those who are living south of the Zambezi on the Trans Zambezi Highway. In the three constituencies, the staple food and crops grown is mainly Mahangu. The Kavango East region receives summer rainfall with the first early rains coming to the region in October and November. The highest rainfall usually occurs in January and May (Mendelsohn, Jarves, Roberts & Robertson, 2002).

Furthermore, the type of soil found in the Kavango East region is not well suitable for crop production. The predominant soil type has a sandy porous texture that dries rapidly leaving little moisture in the soil and holding few nutrients. In addition, overtime, the soil becomes modified by repeated ploughing and crop growth, referred to as arthrosols, which is a mixture of fluvisols and aerosols that progressively decrease soil fertility (MLR, 2013). The other similarities of the three constituencies are the Small Scale Commercial Farms (SSCF) mostly consisting of dry farming activities and these farms are located further away from the Kavango River South of the Trans Zambezi Highway. Farms are typically an average of 1.9 hectares in size and the main crops grown include mahangu, sorghum and maize as well few vegetables produced for local consumption (MLR, 2013).

In the meantime, there are many constraints to this type of farming, example enlisting poor market infrastructure, inland farmers are located in areas of poor soil qualities and erratic rainfall. The outcome is low yields with surplus harvests rare to come by. Mahangu and other dry land crops are generically grown on small portions of land mostly along the Kavango River and within the vicinity of rural villages while most of the farming is done manually or by ox-drawn plough (Decosa, 2013).

Electricity distribution like in the rest of Kavango East Region is poor and mainly found along the Trans Zambezi Highway but at times there is no distribution to the south of the road. Telecommunication services, in all three constituencies under study are poorly distributed with signal only found in the northern parts while there is no coverage in the central and southern parts of the constituencies. Sanitation in Namibia is a challenge and the

same is true for the constituencies of Rundu Rural East, Mashare and Ndiyona where 80.4% of households do not have access to toilets.

7.4 Findings from interviews

7.4.1 Profile of the participants

Most of the participants were between 35 and 70+ years of age. Qualification wise, interviewed councillors were not willing to disclose their qualifications. However, one of the Councillors is a member of the National Council. Members of the Local Development Coordinating Committee (LDCC) and households preferred to speak in their native languages as they were just elected for being active members of the community and not necessarily for being qualified. In most households there were elderly men and women who have been living there before independence and they did not have proper education. However, according to the study's observation, some of the officers in the set up of the constituencies seemed to be educated.

7.4.2 Responses from Constituency Councillors

The three councillors of the constituencies under study highlighted that they were well aware of the concept of food security in the community and that they were busy with the drought relief programme in Mashare, Ndiyona and Rundu Rural East. They were trying to get the situation under control although the drought relief programme is headed by the Ministry of

Agriculture Water and Forestry under the auspices of Risk and Disaster Management of the Prime Minister's Office.

The councilors said that there were policies made to reduce the critical and pervasive food insecurity problem in their areas and that is why five of the twelve green scheme programmes in Namibia are located in Kavango East Region. The green schemes found in Kavango East are Shandikongoro Irrigation Project that produces maize, wheat and sunflowers, Ndonga Linena Irrigation Project that produces crops like maize, onions, watermelons, butternuts, gem squash, sweet potatoes and wheat and the Shitemo Irrigation Project producing maize, wheat and pumpkins.

The Mashare Irrigation Project produces maize and wheat. However, in Mashare there is a Mahangu project but the mahangu produced is not for consumption but for research purposes and certified seeds. The research centre is called Omahenene Research Centre located in Omusati Region. After the grains are certified, they are given back to the community of Mashare for ploughing but they do not give enough to the community to plant crops for their survival for the whole year.

The irrigation scheme in Kavango East Region is the Uvhungu Vhungu Irrigation Project and the current crops produced include maize, wheat and vegetables. Lastly, there is the HJM Agri-scheme in the Ndiyona constituency which is under dispute as local villagers claim that they have not been consulted on its inception but in the meantime, there is also the infant Corococo Rise Project to be implemented.

The participants said that there were policies on mahangu production, processing and storage as a staple food but the policies were not fully implemented so that the small holder farmers and households benefit from policies. In Ndiyona the participants said that there was nothing concerning production policies of mahangu but they were few gardens owned by individuals. In the mean time, the Mashare mahangu project scheme is not for consumption but for research.

The participants said that no foreign agencies were allowed to partner with individuals in the constituencies but in general the Food Agricultural Organization (FAO) advised the government on how to tackle the situation. According to the participants, it was said that no partnership in the three constituencies except in Rundu Rural where there were some co-operatives.

In addition, there are National Strategic Food Reserves (silos) in the Kavango East Region in general. The respondents agreed that it is true that there were National Strategic Food Reserves (silos) in Kavango East Region especially in Rundu and Ndonga Linena which had a capacity of 4000 tonne storage capacity, but not for mahangu storage. The councillors said that they could not comment on the specific seasons and months which the grain storage would be full and where to get mahangu to fill the National Strategic Food Reserve (silos) because they did not fall under their jurisdiction. This means that some of the silos in the three constituencies are Holding Bins of private companies or individuals who are waiting for the owners to get customers.

The councilors said that plans were in place but the land was under the auspices or jurisdiction of the traditional authority. The councilors also added that they received the assistance from the government in the form of drought relief programmes. On acquiring land, the response from the councilors was that the land in communal areas is communally owned without free-hold ownership. However, sometimes they liaise and coordinate with the traditional authority and councillors to acquire land for the benefit of the community. There are National Strategic Food Reserves (silos) in Kavango East region plus Holding Bins for the private companies but they are not under the councilor's jurisdiction.

A question was asked whether there was any time the councilors were asked about food security and they responded and said that they were asked about food security by the researchers from the National Planning Commission but in Ndiyona, they was only a survey on households security and nutrition. The Councillors were also asked about the NDF participation on the food relief delivery because one of their mission statements of the NDF is to assist the civil authority if they are requested. The councilors of Rundu Rural East and Mashare responded that they were impressed by the Namibian Defence Forces' way of doing things especially in the delivery of the drought relief food and the pace to move from one place to another in comparison with other contractors. However, there were some inhabitants who were reluctant to co-ordinate with NDF because of the historical events reflecting injustice of racist regime forces before independence. This means that the remote areas especially the southern part of the Trans Zambezi Highway are not familiar with the mission statement of the Namibian Defence Force and in Ndiyona constituency, the participants said that they had not seen any NDF services being implemented.

The councillors reiterated that the combination of all humanity security taking into consideration the economic, food, health, personal, environmental, community security and political security will obvious tackle the situation of staple food production, processing and storage as well as food insecurity and poverty will be eradicated.

7.4.3 Response from the Local Development Coordinating Committee

The local development coordinating committee responded and said that there was a very serious concern about the production, processing and storage of staple food mahangu in their constituencies and it was only God who could solve this horrible situation of hunger and poverty. The LDCC are well aware and agreed that the government is doing a lot for them although it is not enough. The government provides them with drought relief food, seeds to plough during the rainy season and tractors to help them. However, seeds are few, the tractors come very late and courses delay.

The perceived factors which are hampering the production, processing and storage are many and in the same vein three pillars are interlinked and dependent on each other because if there is no production there would not be processing and storage. Mahangu is a rain fed crop and if there is no rain, there is disaster for all the community of Rundu Rural East, Mashare and Ndiyona. The other factors are natural disasters such as drought, pests and wild animals.

Some participants highlighted that in the communities of Rundu Rural East, Mashare and Ndiyona laziness on the part of the community members can contribute to the non-production of food, poor processing and poor storage. Lack of productive material resources can

contribute to food insecurity and once again it has to do with the capacity of certain households to fully utilize their crop fields in the absence of necessary tools such as ploughs and oxen.

According to the Local Regional Development Committee, in some of the constituencies like Rundu Rural East they have some cooperatives that focus on tomatoes, cabbages and carrots. Mahangu is mostly used for consumption only because the cultural norms sometimes impede on mahangu to be commercialized; however, in some areas they use mahangu for trade in traditional liquor well known as Tombo which is negatively affecting some community members.

The response of the participants is that gender equality is gaining momentum and in all constituencies women are elevated to the position of leadership to have an equal number with men. In Mashare and Rundu rural they are five men and five women but it also depends to the quality of leadership one possesses to be elected in communities. The participants said that sometimes they do not prepare for problems because of lack of resources to confront disasters, however, at the level of the region there are some contingent plans for the communities to be sensitized on disasters and warned of the incoming problems. It was said that in the community of Rundu Rural East they have extension officers on permanent basis while Mashare does not have any agricultural extension officers. In Ndiyona, they said that it is only on few occasions when they see people advising them on the agricultural methods of farming but they do not know if they are agricultural extension officers or not.

7.4.4 Response for Households

The response from the households was that their apparatus to produce mahangu are oxen, tilling, hoes and in the few occasions tractors for those who can afford. They added that the problem with the tractors was that they delayed people to plough because they were few and expensive to hire. Adding to the production is the processing method which is mostly done by beating with sticks. Anyhow, in the communities there is some harvesting machinery but again the majority of them cannot afford them. The individuals who own machinery are also trying to make their living through them that is why is difficult for them to compromise when it comes to hiring them out to other community members. With regards to storage, when it comes to mahangu they use bags for storage, house store rooms and the traditional storage of Omaanda or invented structures. In the market, storage bins are used which are very scarce especially to the remote areas and expensive to buy.

“There is nothing we can do regarding food security at home level but the problems are very severe and it also depends to the family and the most people who are far from settlement especially South of the Trans Zambezi Highway are in dire situation of food security” said one participant (Councilor). He added that the truth is that women are more involved in the production of food.

To maintain the mahangu until the next season it was said that it depends to the way of living of households, the size of the plot of mahangu, the availability of production methods and the rain because everything depends on rain. The government, according to the households in all

the communities, is trying very hard to support drought relief programmes but when it comes to seeds, they are not enough for the households to plough on the whole plot.

Another head of household highlighted that when it comes to mahangu, there are only able to purchase at open market if there have the money to do so. The price of mahangu especially from the months of August to December is exorbitant in the open market because of desperation. According to one of the participants, if the households of the three constituencies do not have Mahangu, they only rely on the maize from shops or market and supplemented by the wild fruits like Maguni, Magueti, Musivi, Namgondo, Musivi, Ngongo, Makweo and Mopani worms but the maize comes with a price. The participants of the three constituencies were not aware that individual households could be provided with maniac or fertilizer for free as it is usually expensive to buy.

7.5 Discussion and Findings

This study was carried within the three constituencies of the Kavango East region, the Local Development Coordinating Committees and households taking into consideration the gender differences (male and female). The case study was carried in Rundu Rural East, Mashare and Ndiyona constituencies respectively. In addition, the sample was selected purposively. Although age and level of education could be taken into consideration, the councilors were members of constituencies their education level is not taken into consideration when they were selected . They have different criteria in which they required their members to be selected.

During the research findings, the study found that there were a number of challenges and factors that hampered the production, processing and storage of mahangu activities. The factors include gender, environmental factors, technology factors, social factors and economic factors.

7.5.1 Gender

It was found out that women were disproportionately affected because of their close connections to the environments. In addition, rural women were responsible for house chores particularly the fetching of water and energy sources including charcoal and fire wood for cooking and heating. It was said that the majority of the women were involved in agricultural activity or in the production of mahangu because they did not have anything to survive on and they had to take care of their children. At the same time, most of men migrated to towns and were cohabitating with other women and forgot to supply the necessities to their wives and children. Some participants said that women remained at home without anything to eat and nothing to satisfy the necessity of the children and men were involved in drinking without thinking back home.

The study found that the little money which the women get sometimes is spent on food for the children. The study concluded that it was rare to find women working in towns while their husbands are in the village and taking care of the children. The elderly women are mostly left with the little ones (grandsons and granddaughters) while their young parents migrate to towns in search for better education, employment as well as a better life.

In the rural areas women are abused because they are not sensitized about gender-based violence and are afraid to report these cases. There is a lack of communication because some women do not have mobile phones, roads are not conducive and households are very far from the services such as hospitals and clinics. Most of the rural women in those three constituencies under study are not connected to the social networks, from the Ministry of Gender Equality and Child Abuse and very few get invited to attend women issues. Some women do not attend because the distances between the towns and settlements are long.

According to the Kavango Poverty Profile, the birth rate is high in the remote areas and it causes women to be heavily affected by womb cancer because no checkups are done on time and sometimes is not easy to report their pain on time (PPA, 2010). Women in the three areas under study said that there was lack of communication and sometimes for them to get information they would need radios with batteries. According to the United Nations Environments Programme (UNEP), called women empowerment through climate-resilient Agriculture, helps women farmers to use new techniques and technologies, particulars resilient seeds, to ensure that agriculture is better able to stand erratic rain, drought and floods cycles. The programme also tackles crop waste caused by lack of markets and proper storage facilities. Eventually the goals are for agricultural products to eventually reach bigger markets, not just local ones, where profits will be high.

The study found out that women were still being sidelined when it comes to agricultural activities. Some Councilors indicated that women needed to be fully involved because of having that maternal instinct when it comes to feeding and value addition, leading to poverty

and eradication in their constituencies. The councilors were also of the opinion that women should be given land to start agricultural activities and have access to necessary financing.

7.5.2 Environmental Factors

Kavango East Region is highly impacted by the environment due to lack of rain in the region, leading to low agricultural yields and leaving many households with inadequate food supplies. The constituencies have water shortages because of insufficient water pipelines, boreholes and earth dams for the communities. The soil fertility in the region has dropped due to yearly crop production and lack of livestock to provide manure, leaving communal farmers struggling with unproductive soil. The repeated crop cultivation has also resulted in deforestation and land erosion. Some environmental problems are highly connected to El Nino. The study was of the view that the region needed to have climate-smart initiative such as quality seeds, new farming techniques and social protection programmes for the vulnerable communities.

7.5.3 Technology factors

It was found out that the community in the region does not have access to the latest agricultural and means of production, as well as general scientific knowledge in agriculture. The lack of latest agricultural adopted technologies in the constituencies is a major challenge. The community also did not have enough tractors to plough their field, resulting in farmers ploughing their fields with oxen which is a slow process and farmers end up not ploughing big portion of their fields, hence a need for the mechanization of agriculture to produce

enough food for the region. The communities in the three constituencies also do not have fences to protect their crops from animals. There is a need to train and educate small holder farmers on modern farming techniques and the importance of food security and self sufficiency in the community. The lack of technology in the region also hampers locals to access tap water from the Kavango River for agricultural purposes.

7.5.4 Social Factors

The social factors that the study found during the research process are that young people are not interested in mahangu production because crop production needs patience. Unlike in the other northern regions of Namibia where households are built within the mahangu plots, the community in the Kavango East region has a culture of living far from their mahangu plots. This results in non-monitoring of the mahangu plots. As a result, birds and wild animals destroy the fields because most of the fields are not fenced off. The study also found out that there was reluctance from the community members to work in the agricultural sector and that resulted in high incidence of food insecurity in the community. The study also discovered that there were high incidences of food insecurity in female headed households as compared to male headed households because more women were unemployed than men. Food security also decreased with the number of people in the respective household.

7.5.5 Economic Factors

The research found out that the inhabitants of the three constituencies under study lacked the economic know how and were struggling to acquire quality seeds and market for their crops,

therefore communal farmers needed to be assisted with quality seeds. The inhabitants or the community lacked appropriate financial institutions and human resources that would sensitize the community on the economic benefits resulting from harvesting mahangu. The study also noted that constituency councillors were not equipped with proper financial governance that could extend to the communities, hence a need to increase capacity building of all actors including decision makers and implementing agencies.

The study identified that there was a need to have local organizations that could promote small scale industrialization at the community level and work as a linkage between the agricultural producers and industries to enable local products gain in wide markets. Consequent to that, it was realised that in Kavango East Region, the farming community in the region has a challenge of access to remunerative markets, price information and business development. The study also noted that plots allocated to communities to cultivate mahangu in the region were small, necessitated by demand and supply factors.

7.6 Summary

It can be concluded that the issue of food security at the community level is not given the serious attention it deserves from the high hierarchy of the government. There is a lot that need to be done in order to achieve food security at the local level of the Kavango East Region, whereby policies are in place but not well executed and implemented. The study observed that local level development committees appointed their influences in the community, hence the management of the local development committee should be appointed taking into consideration the age and level of education. There is also a need for the

Government need to conduct seminars and workshops for the local management teams to understand what is expected from them in terms of developing the constituencies in all sectors. Particularly, Agricultural Extensions Officers need to be locally-based or assigned to specific constituencies for close attention. The ultimate solution to combating hunger and food security at the constituencies, regional, national, continental as well as global level is to provide undernourished people with opportunities to earn adequate income and ensure abundant supply of food from either domestic production or both (FAO, 2000).

Governments around the world are beginning to recognise and respond to the linkage between food and conflict. Uganda, for example has merged its Ministry of Agriculture, Animal Industry and Fisheries are both consequence are drivers of conflict, food insecurity creates a cyclical, self-perpetuating system that leads to prolonged conflicts for example, changes in climate which stress agricultural production have driven migration, urbanization and shifts in land use as coastal plains becomes more vulnerable to flooding. Man-made conflicts involving divisive ethnic feuds and ongoing civil wars in countries like Democratic Republic of Congo, Sudan , South Sudan, and Central African Republic have restricted access to food, continuing to destabilize the political environment.

CHAPTER 8: CONCLUSIONS AND RECOMMENDATIONS

8.1 Introduction

This chapter concludes the study done to investigate food production, processing and storage at community level in three constituencies of Ndiyona, Mashare and Rundu Rural East in Kavango East Region. The chapter provides recommendations to the relevant stakeholders for future action on food security in Namibia. Apart from recommendations for future action, the chapter also provides suggestions for further studies.

8.2 Conclusions

Food production is a major problem in the Kavango East Region. The study revealed that most of the respondents are aware that poor production, processing and storage exist because everything depends on rain and at least nothing has been done to counter the balance and reverse the trend of depending on the rain for production when it comes to the communities and households of the three constituencies. The study acknowledges with the literature review that Kavango East Region is prone to climate change that is why food production and security cannot be achieved without environmental effects mitigation. Quoting from the Poverty Profile Assessment of Kavango East Region (2003), the climate in Kavango East Region only supports dry land cropping of mahangu (Finger millet) and rearing of livestock.

8.3 Recommendations

Following the findings and conclusions of the study, it is recommended that:

- The community must be encouraged to practice early planting of Mahangu and there is need to provide incentives for the young people to stay in the rural areas for them to work on the Mahangu fields during the rainy season between October and March;
- The Kavango East Region inhabitants must be encouraged to adapt the culture of protecting their mahangu fields from wild animals and birds by living closer to the plots especial during rainy season which is regarded as the productive time;
- The agricultural authorities need to re-evaluate or implement policies for self-sustaining communities and such policies may include:
 - Land policies for promoting land planning, intensive agricultural practices, as well as environmental management.
 - Policies aimed at subsidizing the cost of agriculture implemented and inputs of providing mechanized should be explored and evaluated.
 - Price control of staple food must be introduced and encourage people to produce more.
 - Policies and procedure for distributing and timing famine relief need to be made more effective.
 - Policies and strategy to achieve greater food security must be implemented, evaluated monitored and enforced;
- Expansion and extension of food for work programmes to pave the way for people to work in community project;

- Introduction of the community strategy food reserves (storage) for locals to store mahangu for emergencies;
- Communications roads which are cleared by communities must be gravelled because if not, some remain impassable and it will be difficult for the tractors to have access to the remote areas especially on the southern part of the Trans Zambezi Highway;
- Mechanization of crop farming through government efforts of making tractors available at subsidised rates or loaning during the planting season;
- The government must consider digging more wells and constructing more earth dams to mitigate the impact of no access to clean water; and
- Consideration should be given to diversify food production and marketing and encourage more water efficient irrigation technologies such as drip irrigation in the interest of more efficient water use.

8.4 Suggestions for Further Studies

Due to the limitations of the study in terms of time, financial resources and mobility, it is suggested that a study of this nature can be funded and carried out on a broader scale for all the northern regions of Namibia.

5.5 Final remarks

This chapter presented the conclusions and recommendations for the study done to investigate food production, processing and storage at the community level in three constituencies of Ndiyona, Mashare and Rundu Rural East in Kavango East Region. The

study found that the Kavango East Region has the potential to be the bread basket of Namibia if interventions are done to overcome constraints, limitations and challenges. Findings from the study and conclusions have been drawn in this chapter and recommendations have been suggested to enhanced food production, processing, and storage of the staple food Mahangu in Kavango East Region. The agricultural authorities have been recommended to review agricultural policies for enhancement of food security in Kavango East region and the whole of Namibia. Finally, in depth further studies have been suggested for all the northern regions of Namibia.

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APPENDICES

Appendix (i) Letter from Unam Faculty of Military Science

FACULTY OF SCIENCE: SCHOOL OF MILITARY SCIENCE

Dr Vincent M. Mwangi: Senior Lecturer/Associate Dean

University of Namibia, Private Bag 13301, Windhoek, Namibia

340 Mandume Ndemufayo Avenue, Pioneerspark

☎ +264 61 206 4843; Fax: +264 61 206 3791; E-mail: vmwange@unam.na; URL.: <http://www.unam.edu.na>



TO WHOM IT MAY CONCERN

11 August 2016

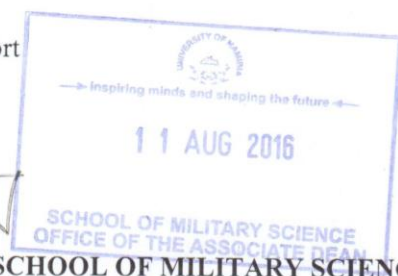
This letter serves to confirm that E.W.Mwoombola (**Student No: 201300186**) is a final year candidate for the Master of Arts in Security and Strategic Studies (MASSS), Faculty of Science, School of Military Science. In this regard the student is required to conduct a research project as part of the requirement to complete the Master's programme successfully. The topic of the research is **An Analysis of the Mahangu production, progressing and storage in Kavangó East Region.**

Therefore, the University of Namibia is requesting your good offices to grant the student all the necessary assistance for him to obtain information required to write his thesis. The research findings will be used for the masters study purpose only and the participants' opinions/views will be kept confidential.

Thank you for the support


DR.V.M.MWANGE

ASSOCIATE DEAN: SCHOOL OF MILITARY SCIENCE



Appendix (ii) Permission Letter to Conduct the Research in Kavango East Region



KAVANGO REGIONAL COUNCIL

Tel. No:	066-266000 / 266006	Private Bag 2124
Fax. No:	066-255378	RUNDU
E-mail:	mmmangundu@kavangorc.gov.na	Namibia
<i>Enquiries:</i>	<i>Mr.MM.Mangundu</i>	<i>24 August 2016</i>

To: Dr.Vincent M.Mwange
Senior Lecturer/Associate Dean
Faculty of Science:School of Military Science
Unam

SUBJECT: CONFIRMATION OF PRESENCE OF MR.E.W.MWOOMBOLA IN KAVANGO EAST REGION FOR RESEARCH PURPOSES

The Kavango East Regional Council acknowledges the presence of **Mr.E.W.Mwoombola (Student No: 201300186)** from your institution(UNAM) with the purpose of conducting his research Project on the Topic Analysis of the Mahangu Production,Progressing and Storage in Kavango East Region.

He requested us to assist him to arrange appointments in the three constituencies of **Ndiyona,Mashare and Rundu Rural**.We would like to inform you that the student was present to all these constituencies and did his job as required.

Please accord him further support and wish him success in this project

We thank you


MR.MM.MANGUNDU
ACTING DIRECTOR: DEVELOPMENT PLANNING, MONITORING AND EVALUATION
KAVANGO EAST REGION



Appendix (iii) Interview Guide for Councillors

1. According to the UN commission on human security (CHS, 2003) human security entails, using process that build on people's strength and aspiration, it means using creating political ,social, environmental ,economic ,military, and cultural systems that together give people the building blocks of survival livelihood and dignity. Are you aware of the concept of food security?

2. In your opinion or in your set up is there any political system or policy in your area that is specifically focused on reducing critical and pervasive food insecurity? And what is the name of the policy?

3. Are you aware of there any government programmes or policies existing regarding mahangu production, processing and storage as staple food in the constituency?

Are there any foreign agencies that cooperate with your constituency in addressing the food insecurity in your area?

4. What other public partnership initiatives or programmes in your opinion have been implemented regarding the production, processing and storage of Mahangu?

5. Do you have storage facilities available in your constituency?

If yes how many are they within your constituency

During which specific seasons and or months are storage facilities full half or empty?

6. Where does the constituency get Mahangu to fill the silos?

Do you get Mahangu from other constituencies?

7. Are there any plans to implement any green scheme projects within your community?

-In terms of agricultural production and the availability of food, do you and your community receive any support from the Government of Namibia?

8. Are there any strategic plans to assist you and your community in acquiring arable land suitable for farming on crops?

9. What do you do with inhabitants who do not have land to cultivate on?

11. What impact do silos have in your constituency?

12. What benefits do you think will bring, will silos if they are implemented in other constituencies?

13. The Namibian Defence Force (NDF) mission statement includes assisting the citizens when called upon to do so, have you experienced NDF efforts towards food security? If there was in which form was that assistance? When and where?

14. How effective was NDF assistance to food security in your in area?

15. Have you been asked food security research question before?

16. Do you agree with the notion that military security, human security and sub types such as economic, food, health, personal, community, environmental and political security would effectively tackle food insecurity in your area?

Appendix (iv) Interview Guide for Regional Development Coordinating Committee

[Food security}Definition: The availability of food, access to food and food utilization.

1. As the regional development committee of the region in the constituencies, do you have any concerns regarding the production, processing and storage of Omahangu?

-if yes what are your concern? How do they feature within the short and long term vision that you have for the community?

-if no, please elaborate as to why you are satisfied with the current production, processing and storage of Mahangu?

2. Based on your answer in question 1, do you feel that you (a) receive adequate assistance from the government of Namibia?(b)if yes, what type of assistance do you receive?

3. In your opinion what are the perceived factors which can negatively influence production, processing and storage of Mahangu in your constituency?

4. Do you have agricultural co-operatives in your constituency?

-if yes how do they contribute to the community?

5. What other benefits does Mahangu have apart from consumption purposes?

6. Within your community, do you utilise Mahangu for any other purpose a part form Millie?
7. Does the coordinating committee have women as a member? If yes how many women are members and where they selected purposely as a gender balance? No why?
8. How do you deal with early warning systems when it comes to community preparation for droughts, floods, and other environmental factors?
9. Do you have agricultural extension officer on your constituency?

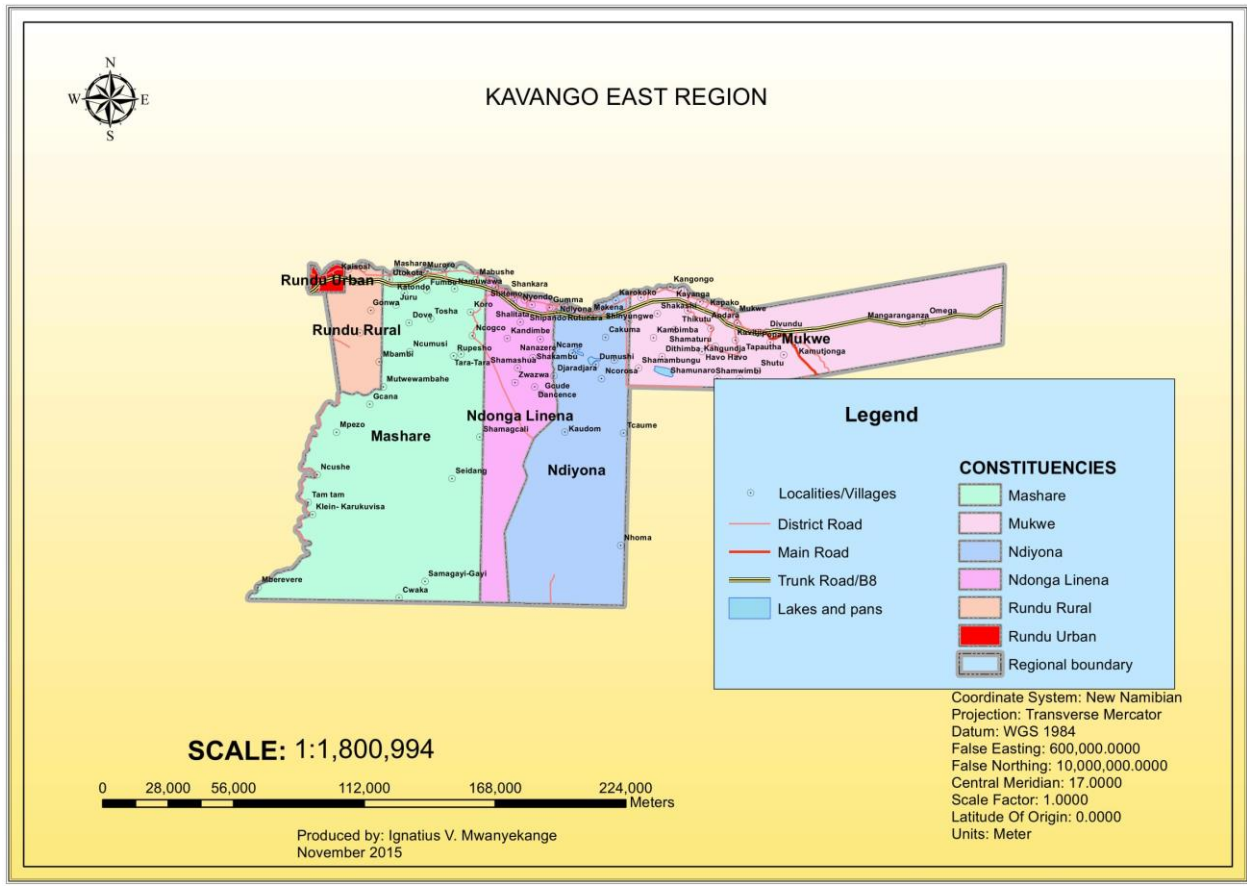
Appendix (v) Interview Guide for heads of households

1. What agricultural apparatuses do you use to produce Mahangu?
2. What processing method do you use to process your crops?
3. What kind of storage facility do you use for your grains?
4. What are your personal opinions regarding food security at home level?
5. Do you think women are more involved in the production of Mahangu than man elaborate?
6. Does the Mahangu that you produce and store last until the next harvesting season?
7. Do you receive any help from the government towards Mahangu production?
8. Are you able to purchase Mahangu in the market if your storage is depleted?
9. Does the price of Mahangu change if there is a disaster such as floods or drought?
10. Do you have other types of food which you can eat if you no longer have Mahangu available?
11. What challenges do you face as a women?
 - a. Production?
 - b. Storage?
12. How do you overcome challenges?

13. Do you have enough land to cultivate on yes? Is the land fertile to Germanize the Mahangu sufficiently, Have you done anything on that?

14. What do you do if the land is not producing enough due to land erosion do you receive fertilize and seeds or maniac?

Appendix (vi) Kavango East Constituencies



Appendix (vii): Mahangu storage round baskets huts on legs



Appendix (viii): The Rundu silos

