AN INVESTIGATION INTO THE CONTRIBUTION OF AFRICAN INDIGENOUS VEGETABLES IN FOOD SECURITY AND NUTRITION IN THE NORTH-WEST PROVINCE: CASES FROM SANNIESHOF AND LEKGOPUNG COMMUNITIES (NGAKA MODIRI MOLEMA DISTRICT MUNICIPALITY)

By

Fanti Stephens Pitso

A Mini-Dissertation submitted in partial fulfillment for the Master of Arts (Indigenous Knowledge Systems) to the Faculty of Human and Social Sciences, North West University.

Supervisor : Prof. H.O Kaya (North-West University)

External Examiners : Dr. M.Masoga (Development Bank of Southern Africa) and Dr. T. Medupe (University of Cape Town)

July 2009

TABLE OF CONTENTS

LIST OF TABLES **Page**

DECLARATION

I, Fanti S. Pitso hereby declare that this mini-dissertation for Master of Arts in Indigenous Knowledge Systems, submitted to the North-West University, has not previously been submitted for a degree at this or any other university, and that it is my own work in design and in execution. All the reference material contained therein has been duly acknowledged.

.... Date 19/08/09

F.S Pitso

ACKNOWLEDGEMENT

I have not traveled in a vacuum in this journey. This thesis is the end of my long journey in obtaining my Masters of Arts in Indigenous Knowledge Systems (IKS). There are some people who made this journey easier with words of encouragement and more intellectually satisfying by offering different places to look at to expand my theories and ideas. Special thanks to my Supervisor Professor H.O Kaya who shared with me a lot of his expertise and research insight. He quickly became for me the role model of a successfully researcher in the field. His overly enthusiasm and integral view on research and his mission for providing only high quality work on research and not less has made a deep impression on me. I owe him lots of gratitude for showing me this way of research. He could not even realize how much I have learned from him.

No amount of prose would give proper credit to my most ardent supporters my wife Barata and my two lovely children Tshegofatso and Segomotso who I owe my loving thanks to. Without their encouragement and understanding it was going to be impossible for me to finish this work. They played a significant role in my life and with the gift of their company they made my days more enjoyable and worth living. One of the best experiences that we live through in this period was the birth of our grand-son Tshwanelo Metlholo Pitso who provided an additional and joyful dimension to our family.

I feel a deep sense of gratitude for my late father, brother in law and my sister who formed part of my vision. The happy memory of the above mentioned still provides a persistent inspiration for my journey in this life.

However, because the list might be too long and by fear of leaving someone out, I will simply say thank you very much to you all. Lastly and importantly I wish to thank my mother for giving me a loving environment to develop. Finally, I am paying a very special tribute to the omnipotent God Almighty for being a source of guidance, inspiration and protection. Above all, it is through His will that I arrived at this destination.

ABSTRACT

The study investigated the contribution of African indigenous vegetables in food security and nutrition in the North-West Province, with a special reference to Sannieshof and Lekgopung communities. The study found that although South Africa is a country of national food self – sufficiency and is able to export food, hunger and malnutrition are still found in many rural and urban areas. The study found that African indigenous vegetables are of great importance in helping to alleviate these problems. The small scale farmers, especially women, most of them being unemployed, cannot afford to purchase the expensive exotic vegetables. However, in spite of this contribution, the cultivation of indigenous vegetables is rarely supported by government. Most people due to the influence of western eating habits consider indigenous vegetables as a poor man's food. The introduction of exotic plants species has gradually displaced indigenous food crops in many local diets. It has also meant a loss of indigenous knowledge systems related to cultivation and utilization of these crops.

The study recommends amongst others that there should be extensive educational campaigns to raise awareness and knowledge among the public and government on the importance of indigenous vegetables; researchers need to research more about the nutritive value of indigenous vegetables; policy makers should incorporate the production of indigenous vegetables into existing and future food security and nutrition policies and government should facilitate the promotion of markets for indigenous vegetables as part of poverty eradication policy frameworks.

DEDICATION

This work is dedicated to all Indigenous Knowledge holders who do not hesitate to share their knowledge and wisdom for the survival of mankind; for knowledge is the only treasure that one can give out entirely without running short of it.

CHAPTER ONE

INTRODUCTION

1.1 Background

Micronutrient deficiency continues to be a major health problem in South Africa and Africa at large. It has far reaching consequences on the growth, development, and health, especially of women and children. Van de Heever (2000) indicates that despite South Africa's national food security compared to other countries in the Southern African region and the continent, the experience of the majority of South African households is food insecurity, malnutrition, and unemployment.

African indigenous vegetables play an important role in food security of the underprivileged, in both urban and rural settings. They serve as primary foods or secondary condiments to dishes prepared from domesticated varieties. They are also valuable sources of energy and micronutrients in the diets of isolated communities. Moreover, they serve as income sources and may be marketed or traded locally, regionally and even internationally.

Gbile (1998) defines vegetables as plants which are consumed in addition to starchy basic food in order to make it more palatable. In this study an indigenous crop refers to a crop species or variety native to South Africa and region, or to a crop introduced into the region where over a long period of time it has evolved, although the species may not be native (Engle and Altoveros, 2000). FAO (2001) notes that although indigenous vegetables are an integral part of agricultural systems in most African countries, most African governments have not given them priority in crop development. Most studies on vegetables in research institutes and universities in Africa have focused on routinely cultivated species. In addition, the diversity of African indigenous vegetables is being seriously eroded as a result of multiplicity of environmental, political and socio-economic factors. These include:

- Erosion of culture and breakdown of traditional systems of plant resources management resulting into loss of traditional varieties;
- The world market has been tailored to focus on only a few crops to the extent that the industrial growth globally is dependent on continued supply of these few "elite crops" at the expense of the traditional varieties;
- Deforestation desert encroachment, and erosion lead to land degradation with concomitant loss of the plant genetic resources that the land supports;
- Natural disasters, including drought, floods and pests and diseases, which have led to widespread losses of plant diversity from both farmers fields and natural habitats;
- The replacement of local varieties by improved or exotic varieties and species. Climate change, which poses a threat to diversity, as many plants are unable to cope or adapt to changing temperatures and moisture gradients caused by global warming and the associated climate change;
- Political instability, civil unrest and insurgence that have led to loss of genetic resources in fields as farmers flee from war torn areas and as ex-situ conservation facilities are destroyed;
- The research mandates of most institutions focus on the routinely cultivated species at the expense of the indigenous species. This has resulted in the continued and ever-increasing relevance that the routinely cultivated species are enjoying and promoted.
- African governments including those in Southern Africa are not making adequate investment in the area of conservation of their indigenous plants heritage.

In spite of the above limitations, there is currently an increasing realization on the importance of African indigenous vegetables for human nutrition, medicine and income generation in the region and the continent as a whole (Ottowa, 2006; Oniang'o, et al, 2003). Rubaihayo (1994) indicates that domesticated vegetables are grown in small plots adjacent to human settlements as an age old survival strategy. These vegetables demand minimal attention in their production.

Under emergency situation, the production of indigenous vegetables is crucial for many households and communities since they come into production within a short time soon after the onset of rain.

Machataire (2006) states that to evaluate the potential of indigenous vegetables in terms of production systems it should be noted that some indigenous vegetables such as amaranth adapt easily to hash or difficult environments. As such, the inputs required for growing them is lower compared with that of exotic crops such as to tomatoes and spinach, cabbages among others. Fewer chemicals and pesticides are necessary because of their higher resistance to pathogens. These typical famine food plants grow fast after the first rain showers and can be consumed shortly after.

Van den Heever (2000) adds that the use of wild plants as leafy vegetables is very common in South Africa and some of these are also very popular. Some species are more sought after than others because of early maturity, repeated harvesting, little input required, high yield (large leaves), short cooking time, good taste, can be dried and low water content, among others. In most South African households indigenous vegetables are consumed daily to several times a week during the rainy season because of being abundant while during dry season frequency of consumption span from once or twice a week. Generally indigenous vegetables are used to fill the relish gaps and in so doing they contribute to the food security and also provide dietary diversity for people. Indigenous vegetable plants have also medical value. For instance, the roots of spider flower are used to relieve pneumonia and it is also used as infusion to wash saw eyes and the roots are used as infusion for burns (Duke, 1992).

We can therefore attribute the low rating of indigenous vegetable to the biased promotion of exotic vegetable by commercial farmers and Agricultural Extension workers The Agricultural extension workers lack information on the plants with regards to their role knowledge and skill relevant to production storage and processing technology.

It is quite obvious from the finding that unless there is a deliberate attempt to change the attitude of Agricultural extension workers and the rural committees, indigenous vegetables will become extinct.

1.2 Statement of the Problem

Smith and Pablo (2006) state that African Indigenous vegetables are often best suited to the rigour of marginal environments because they tolerate drought, poor soils fertility local diseases, pests and serve as cheap, reliable and culturally – appropriate food sources in times of scarcity. They also require minimum management and inputs. However, there is a growing concern in the North West Province about the loss of indigenous vegetables due to the modernization of agriculture and life in general. These valuable plants are treated as weeds and strong herbicides are used to kill them. This loss means a risk to food self- sufficiency at the house hold and community levels.

Rubalhayo (2002) is also concerned about the ignorance which exists among young people nationally and provincially on the importance of African indigenous vegetables in food security and nutrition. The lack of proper and adequate knowledge especially of the nutritive value, methods of production, preservation and utilization, are important limitations for the wider utilization of indigenous vegetables in African local communities. Information about African indigenous vegetable is no longer systematically transferred from one generation to the next, as was the case in the past. As a result of this the knowledge gap on these vegetables between the older generations is widening.

Aaronson (2000) shows that some rural households have made conscious efforts to preserve these plants around their homesteads, in crop fields and communal lands. In recent years, however exotic vegetables have taken prominence over indigenous vegetables in spite of their generally lower nutritive value. The availability of indigenous vegetables has declined drastically because of excessive cultivation of exotic crops and due to habitant change. Another factor is lack of efforts to improve their husbandry and promotion.

The manner in which certain traditional vegetable species are exploited makes them vulnerable to extinsion. Indigenous vegetables are often associated in people's minds with backwardness and eating habits have therefore been changing of late in favour of exotic vegetables such as spinach, onions and tomatoes, among others. There is generally inadequate knowledge on the importance, especially on the nutritional value of African indigenous vegetables.

Midmore (1991) indicates that the disappearance of indigenous vegetables is further aggravated by the fact that the education system in South Africa does not promote Indigenous Knowledge Systems (IKS). Again the agricultural curricula in the schools and colleges have not addressed the importance of African local species in food security and nutrition to any appreciated extent. For instance, the local food service systems do not include African local recipes in their menu. The decline in the use of African indigenous vegetables by many rural households has resulted in poor diets and increased incidence of nutritional deficiency disorders and diseases in the North West Province.

It is on the basis of this that the study made an investigation into the contribution of indigenous vegetables in food security and nutrition in the North-West Province with special reference to Sannieshof and Lekgopung in the Central District Municipality of the Province. The study addresses the following research questions:

- What are the socio-economic and demographic characteristics of the households in the study areas which use African indigenous vegetables for food security and nutrition ?
- What types of African indigenous vegetables are used by these households in the study areas?
- What is the existing knowledge and attitudes of the households in the study areas towards African indigenous vegetables for food security and nutrition?
- What are the advantages and limitations of African indigenous vegetables in food security and nutrition compared to exotic vegetables?

1.3 Rationale of the Study

There is a need to document, describe and publish information on the importance of African indigenous food security and nutrition in the North West Province and South Africa in general due to various reasons:

Several aspects of the production and uses of indigenous vegetable in the North West Province need to be researched and documented to asses their contribution to food security, nutrition, and poverty alleviation and conservation status. Where the species concerned are wild and semi-wild, an important possibility should be considered whether

Domestication could be a viable option. Post-harvest techniques need to be promoted, conserved, improved and defused to aid in the consumption of these species.

A study done by Mathenge (2006) on the nutritional quality of African indigenous vegetable shows that in most cases their nutrient contents is not only comparable to exotic species but often exceeds them. In addition, marketing surplus from cultivated or gathered sources of African indigenous food plants provides many rural households, especially female-headed households, in the North-West Province and South Africa in general, with additional sources of household income to meet various household needs.

A wide range of indigenous vegetables are consumed by local communities in the North West Province and in the study communities in particular. These vegetables contribute greatly to the nutritional well-being of the households by providing people with the essential nutrients required for body growth and development, especially among women and children, and for prevention of diseases associated with growth and development associated with nutritional deficiencies, such as blindness due to Vitamin A deficiency.

Most African indigenous vegetables in the province are specific to certain areas and are consumed by Batswana ethnic groups and are seasonal. In most local communities in the province, households collect African indigenous vegetable species such as wild spider (cleome gynandra) outside the homesteads during the rainy season when such vegetables and other wild food crops are easily available.

The consumption differs according to seasons, type of vegetables, and social status of the household. In the rainy season indigenous vegetables in the study communities are consumed daily to several times a week due to availability, while during the dry season the frequency of consumption ranges from once a week to several times a week. The extent of buying indigenous vegetables is much more important during the dry season. Most of the households, especially in the urban area, purchase indigenous vegetables from the market.

1.4 Aim of the Study

To investigate the contribution of African indigenous vegetables in food security and nutrition in the North-West Province with special reference to Sannieshof and Lekgopung Communities in the Central District Municipality.

1.5 Specific Objectives

The study examined the following specific aspects:

- The socio-economic and demographic characteristics of the households in the study areas which use African indigenous vegetables for food security and nutrition;
- The types of African indigenous vegetables used by these households in the study areas for food security and nutrition;
- The existing knowledge and attitudes of the households in the study areas towards African indigenous vegetables for food security and nutrition.
- The advantages and limitations of African indigenous vegetables in food security and nutrition compared to exotic vegetables.

1.6 Hypotheses

- Most of the young people in the study communities have negative attitudes towards African indigenous vegetables. They consider them to be primitive and backward. They prefer exotic vegetables such as spinach, cabbages, tomatoes, etc.
- African indigenous vegetables contribute to food security and nutrition in poor households in the study communities, especially when prices of exotic species are increasing.

1.7 Methodology

This research project used both qualitative and quantitative research methods. Quantitative research methods such as key informants interviews, focus group discussions and participant observations formed the core of the data collection methods; While a questionnaire was administered to the research sample in an effort to collect supportive quantitative data (demographic data) of the respondents in the study communities. Qualitative methods are frequently used in conjunction with quantitative

Methods to give an overall representation of behaviour within a particular population group. After data from both methods were collected, the results were triangulated for a comprehensive understanding of the research problem. In the social sciences there has been much debate about whether qualitative or quantitative methods are best. Both methods have advantages and disadvantages. Qualitative data collects in-depth information but its ability to be extrapolated to the rest of the population is questionable; whereas quantitative data although providing comparable information, always leaves open the question of validity of responses.

The use of both qualitative and quantitative research methods was deemed appropriate for this research due to the complex nature of the research problem under consideration. Qualitative approaches were used to place quantitative data in cultural context and gather In-depth information on the study communities' cultural attitudes related to the various aspects of the research problem.

Key -informants were interviewed at all levels of the research project as a means to gain in-depth qualitative information. This approach is a traditional method of the anthropologist for extracting cultural knowledge through well-placed individuals in the society. It is part of the ethnographic approach, often being used in situations where access to official records or data is weak or non-existent. Where official records exist, it is used as a means to gain further insight by questioning key people about their modes of life or specific social problem.

Sociologists also use the approach within the field of social interactionist or ethno-methodological research. Key informant interviews consisted of asking questions that were mainly semi-structured or open, allowing detailed, full answers from respondents. This approach contrasts with quantitative questionnaires which allow only controlled and structured responses within narrow parameters.

Another approach used in collecting data was focus group discussions with randomly selected groups of 6-10 community members in the study areas. A focus group discussion is a semi-structured interview in which the discussant knows in advance the topics to be covered. The people included were known to have been involved in a particular

Situation/experience related to the research problem. Focus groups discussions are different from other types of group interview in that they focus on a particular topic and they rely on group dynamics in order to generate data. The interaction is mainly between group members themselves and not between the members of the group and the interviewer. Group interaction is used in this type of research to generate data and as a source of data analysis. The assumption is that there is an interaction that is productive in widening the range of responses, in activating forgotten details of cultural experience/knowledge and in releasing inhibitions that are part and parcel of interviews with individuals.

Qualitative data in the form of audio taped interviews were transcribed and translated into English. Interview and participant observation notes were typed and a content analysis conducted. Quantitative data in the form of questionnaires were checked and coded.

Data were analyzed using SPSS/PC+. Validation checks were conducted through all phases of the research to ensure the highest level of data accuracy.

1.8. Organization of the Study

The research report is organized as follows:

- Chapter one is introductory. It contains the background, aim and objectives, and methodology of the study;
- Chapter Two is Literature review.
- Chapter Three looks at the socio-economic and demographic characteristics of the households in the study areas which use African indigenous vegetables for food security and nutrition;
- Chapter Four examines the types of African indigenous vegetables used by these households in the study areas for food security and nutrition; the existing knowledge and attitudes of the households in the study areas towards African indigenous vegetables for food security and nutrition; and the advantages and limitations of African indigenous vegetables in food security and nutrition compared to exotic vegetables.
- Chapter Five provides the conclusion and recommendations of the Study.

CHAPTER TWO

LITERATURE REVIEW

According to FAO, (2005), Indigenous vegetables are plants that have evolved naturally in a given area. There are also plants that have been introduced and then adapted so well that they have come to be considered local and are referred to as indigenous. The North-West Province is endowed with agro climatic conditions for the cultivation of wide range of indigenous vegetables, few of these plants are domesticated, the majority being wild or volunteer plants. They are abundant in wet season.

Rubaihayo (1994) indicates that domesticated vegetables are grown in small plots adjacent to human settlements as an age old survival strategy. These vegetables demand minimal attention in their production. Under emergency situation, for example arising from civil disorder or natural calamity, the production of traditional vegetable is crucial for many families and communities since they come into production within a short time soon after the onset of rain.

Machakaire (2006) states that to evaluate the potential of indigenous vegetables in terms of production systems it should be noted that plants adapt easily to harsh or difficult environment. As such the input required for growing them is lower compared with that of other crops, fewer chemicals and pesticides are necessary because of their higher resistance to pathogens. These typical famine food plants grow fast after the first rain showers and can be consumed shortly after. Indigenous vegetables are becoming increasingly known for their importance in providing food security to households of North West in rural and urban areas.

Guilt (2002) shows that some have been attributed with having organic properties. Through a process of experimentation farmers have found that by reworking organic plants matter especially from indigenous vegetables into the soil after harvest improves the soil contents that improves yield of cash crops.

Midmore et al. (1991) indicate that poor people often have access to only under utilized marginal land and others have small pieces of land in their back yard. These gardens are turned into a productive service of food and economic security by using narrative agricultural practices and the traditional vegetables that are already locally adapted. Household production uses organic farming practices which are friendly to the environment. Women who own the back yard gardens are sometimes assisted to engage in organic farming because it is cost effective. By using manure generated out of animals, women are able to increase their food fields. Chemical fertilizers are quiet expensive but indigenous organic farming is affordable.

Bekele (2000) show that most of African indigenous vegetables are annual. In the wet season vegetables grow abundantly along roadside, bush, abandoned farms some among main food crops. Often these indigenous vegetables because of their tolerance to wide range of soil and habitat types and are reasonably frost and draught resistant, they become weeds in cultivated land and most farmers mainly commercial ones eradicate them.

Most small scales farmers do intercropping for food security. This cropping system is where two or more crops are planted on the same piece of land. The relevant example as previously alluded is when Amaranthus is planted among the tomato plants to act as a biofumigant to suppress root not on the tomatoe plants or when night shade is planted among the tomatoe to suppress the red spider mites which are a problem on tomatoe leaves. Often wild foods are considered to be a low status food and its consumption regarded as a source of shame. In normal times only children youngsters and poorest families collect and consume regularly indigenous vegetables.

A large proportion of the Lekgopung population does not consume adequate amounts of indigenous vegetables to meet their daily requirements of vitamins, minerals and proteins. Even what is consumed has a large proportion of these nutrients destroyed or lost during preparation and working. This reduces attentiveness in ensuring food security all year round due to the fact very few traditional vegetables are cultivated with the majority being collected from the wild fields. In some of the ecosystems, they are regarded as weeds and are often weeded out and are not available during the dry season.

In the North West Province thousands of rural people suffer from chronic poverty, socio economic marginalization, food insecurity and most recently the devastating impact of HIV/AIDS epidemic. In particular, the combined threat of food insecurity and the impact of AIDS is leading to rural development crisis, which requires integrated and cross sectoral responses. As it concerns HIV/AIDS, the primary challenge of indigenous vegetables is to sustain the food security and livelihoods of the rural poor through the North West Province. In the North West Province, poor rural households and AIDS causes severe labours and shortage of economic constrain that disrupt agricultural activities, aggravate food insecurity and undermine the prospects of rural development.

The limited supply of indigenous vegetables especially during the off season, higher markets price and lower appreciation of awareness regarding their consumption are key factors that limit the vegetable consumption rate in the developing world. A review of species shows that indigenous vegetables could make a positive contribution to world food production because they are well adapted to adverse environmental conditions.

Indigenous vegetables can provide alternative food sources of protein and can alleviate protein malnutrition among lower income families (Midmore, 1991). There are several important indigenous vegetables of which leaves are harvested to make Morogo (vegetable), which can be cooked dried and stored. These leaves are popular and nutritious having protein contents of up to 36%, the vitamin contents of Morogo (vegetable) is depended on the age of the plant, Morogo (vegetable) contains both vitamin A and C. Morogo also compliments the low calcium magnesium and Iron contents of Maize (Madisa and Tshamekang, 2000). Healthy eating is a lifestyle commitment that many people want to make, but are unsure how to proceed. Commitment to healthy eating is easier to maintain if one has the right tool. Indigenous vegetables are low in fat and are free from pesticides. Many people eat meat with every evening meal. This meat consists of mostly higher fat beef, pork or chicken which are given antibiotics as a matter of routine can not maintain a healthy living (FAO, 2005).

According to Butt (2006), people who eat meat are far more likely to contract cancer than those following vegetarian diets. The risks of contracting breast cancer are 3.8 times greater for women who eat meat daily.

Meat-eaters ingest excessive amount of cholesterol making them dangerously susceptible to heart attacks. Vegetarians have 40% less cancer mortality and less likely to suffer from strokes, obesity, appendicitis, osteoporosis, arthritis, diabetes and food poisoning. Dr Colin Consell of Cornell University, who headed the China healthy project conservatively estimates that meat consumption is responsible for between $60 and $ 20 billion of health care cost each year in the USA.

In addition to drugs and hormones, meat is full of pesticides formed from animal eating pesticide laden grain and pesticides then collect in the animals flesh such that meat contains accumulation of pesticides and other chemicals as to 14 times more cancer treated than those in plant food (Delee, 1992) .

In South Africa one in ten Africans is malnourished, one in four children is stunted, and 45% of the population lives on less than $2 a day. In 1999, it was estimated that around 45-55% of all South Africans live in conditions of poverty. It was tragic to note that 22% of households reported that members were going hungry, because they could not afford to buy food and to make matters worse, 32% of households contained no employed people.

Many people in Kenya are undernourished especially children being weaned by pregnant lacting mothers and nutrient-deficiency diseases such as night blindness scurvy and rickets are common in rural areas and slums. To counter these nutritional problems, it is important that the most commonly consumed foods should be indigenous vegetables because they are nutritious. Since indigenous vegetables are consumed frequently in large quantities, those which provide most of the required nutrients should be favoured to avoid the nutrients deficiency diseases (Mathenge, 2006).

In most local communities such as Lekgopung and Sannieshof in the North-West Province, indigenous vegetables are eaten for their bitterness just as pepper is taken for its hot taste. However, some people find this bitter taste unpleasant and reduce it by blending them with other blenders vegetables such as cabbage. Many nutritionists and social scientist believe that the integration of food rich in micronutrients into the diets is the only sustainable way to improve micronutrients status in human body.

Indigenous vegetables play an important role in food security of the underprivileged in both urban and rural settings. They serve as primary foods or secondary condiments to dishes prepared from domestic varieties (Ali & Tsou, 1997). Sysop's study (2006) conducted in Limpopo Province found that 96% of the respondents had consumed African vegetable in 2005. In addition, 95% of the respondents indicated that they had dried and stored some African vegetable leaves to ensure a food supply during the dry winter. The study revealed that during the research they found that as opposed to commercial farmers, people in the area did not use pesticides, chemicals and sophisticated methods of irrigation (Sysop, 2006).

The Agro biodiversity dynamic among small scale farmers relies significantly on local seed systems. In fact community seed systems represent the basis for the conservation access and exchange of plant genetic recourses and enhancement for the effective use of Agrobiodiversity in poor rural communities. Community seed banks and farmers seed fairs are relevant practices to strengthen and improve community seed systems (Gari, 2001). African indigenous vegetables for example Amaranthus, spider flower, cowpea have had an important historical role to play in farming and consumption system across sub-Sahara Africa and the North West Province. They are particularly suitable crops for resource- poor farmers for they are easy to grow and are harvested 2-4 weeks after been planted. They are integral components to many traditional dishes in sub-Sahara Africa and the North West Province. They are cheap and easily accessible source of nutrients for both rural and urban population.

On unit cost basis they are nutritionally rich contributing micro nutrients and increasing the bioavailability and absorption of micro nutrients from staple foods provided that they

are prepared and cooked properly to maintain their nutritional value and are consumed regularly.

Some of the common indigenous vegetables in the North West Province, e.g. Amaranthus, spider flowers, cowpea pumpkin leaves had some direct economic significance in the province. They are sold in the surrounding areas in small volumes. There is a market and some vendors outside the village. The sellers wished they could get more verities as there was a demand for diverse produce of these vegetables.

Food insecurity and the impact of HIV/AIDS are priority concern for rural development throughout sub-Sahara and the North West Province. Special emphasis is placed upon indigenous vegetables due to their potentially vital yet often over looked role, roles in enhancing food security among poor rural communities, as well as in addressing evolving needs owing to the HIV/AIDS epidemic. Unlike other major diseases and epidemic, HIV/AIDS escalates mobility and mortality predominantly on the most active and productive segments of the rural society.

Quite a large number of African indigenous vegetables have long been known and reported to have health protecting properties and uses. Reporting on the moving plant, (Moringa oleifera) in 1937 the British botanist Dalziel observed that the roots, leaves and twigs, as well as the back of the trees are used in traditional medicine. Several of these indigenous leafy vegetables continue to be used for prophylactic and therapeutic purposes by rural communities.

Musinguzi (2006) argues that African indigenous vegetable are a source of anthocyaning and polyphenols which are associated with reduced risk of chronic diseases such as cancer cardiovascular diseases and alzheimer's disease. They are also regarded as important nutraceuticals because of their antioxidant effects which give them a potential role in prevention of various diseases associated with oxidative.

According to Madisa et al. (2006), in Botswana most species are only available locally during the rainy season. The rest grow wild. Cultivation of vegetables is not common however, vigna unguiculata and cucurbita spp are known crops and hence cultivated.

Household food security and nutrition issues are at the height of the planning agenda in many countries in sub-Sahara Africa. Uncertainty in rainfall and low adoption level of improved technologies in crops production have resulted in low levels of food availability in many of these countries. In addition, low levels of income among Subsistence farmers reduces the accessibility to food markets during periods of decreased crops yields. The seasonality in their production and availability of main staple foods results in food insecurity (Butt, 2006).

In Botswana the process is that Africa indigenous vegetables that grow in dry season are harvested during the growing rain season. A type of crop violation sequence. The behaviour suggests that the vegetables could be available through the year as long as the conditions are favourable.

According to Tregold (1986), the manner in which certain traditional vegetable species are exploited makes them vulnerable to extinction. This is especially through vegetable and shrub species who's harvesting involves destroying the entire plant. There are threats of extinction due to land clearing for agriculture, urbanization and overgrazing.
Unfavourable weather conditions such as droughts and extreme temperatures have been experienced in recent years and these have affected populations of some semi-wild and wild species. Traditional vegetables are often associated in people's minds with backwardness and feeding habits have therefore been changing of late in favour of exotic vegetables. There is generally inadequate knowledge on the importance e.g. nutritional of vegetables, leading to neglect. Most traditional vegetables are specific to areas and ethnic groups and are highly seasonal. All these attributes render them less attractive to development efforts, including conservation activities.

Kwatapa (1989) indicates that there is a need to mobilize staff and financial resources at the national level to strengthen the activities of inventory, collecting, characterization, evaluation and documentation of traditional vegetables. For this, capacity-building will be needed in the areas of botany, taxonomy and biotechnology. Promotion of community participation and public awareness of genetic resources and other biological diversity

issues needs to be stepped up at the same time. International and regional collaboration will be required to develop effective strategies for conservation.

This is a major milestone in the development of cultural information that will provide an authoritative look at many neglected food sources which can contribute to food security, agricultural diversification and income generation. Brown (1996) claims that commercial crops pose a threat of genetic erosion to indigenous food plants.

Reduced exploitation of wild and famine plant foods is very unfortunate as some local foods may have better nutritional value than commercial foods. The Food and Agriculture Organization (FAO), (2001) emphasizes that food diversity is the key to good nutrition and wild plant foods can play an important role.

Indigenous leaf vegetables foods have an exceptional place in African cuisine. It is commonly argued that vegetables consumption reflects cultural backgrounds and their value transcends a biological food scarcity to symbolism and enhancing the functioning of society and promoting social order (Onyango et al; 2003). The importance of taste in food acceptance has recently been recognized to play a crucial role in determining the success of food and nutrition intervention programme (Babu et al. 1991).

Kwatapa (1989) indicates that a wide range of indigenous vegetables are consumed in Malawi. These contribute greatly to the nutritional well-being of rural people by providing the essential nutrients required for body growth and development and for the prevention of diseases associated with nutritional deficiencies, such as blindness due to vitamin A deficiency. Rural families traditionally have made conscious efforts to preserve these plants around their homesteads, in crop fields and communal lands.

In recent years, however, exotic vegetables have taken prominence over indigenous vegetables, in spite of their generally lower nutritive value. The availability of indigenous vegetables has declined drastically because of excessive cultivation of field crops and habitat change, including deforestation. This has been exacerbated by a lack of major research and extension efforts to improve their husbandry and promote these

species. Thus, the plants must be gathered at increasing distances from human dwellings, and rural women spend more valuable time in search of them.

There is also a growing ignorance among young people about the existence of these nutritionally rich food plants. The decline in the use of indigenous vegetables by many rural people has resulted in poor diets and increased incidence of nutritional deficiency disorders and diseases in many parts of the country.

The fresh leaves are the edible portion for nearly all vegetables recorded, with a few exceptions where roots, flowers or fruits are eaten. There is little variation in the method of preparation for consumption. The main ingredients used in the cooking recipes include: groundnut flour, tomatoes and onions. Oil is sometimes used instead of groundnuts. Soda is added to those vegetables that form a mucilaginous product after cooking. Some vegetables are dried before cooking, but the basic ingredients in their preparation are the same as those used with vegetables cooked fresh. The dried vegetables are often stored for consumption during the dry season when few indigenous vegetables are available. Preparation recipes and tasted across African Cultures some vegetables taste preferences seem to be entrenched and are usually associated with specific cultural groupings (Owuor et al. 2007).

Indigenous African vegetables consumption reflects cultural backgrounds and experiences, folklore, and how African people perceive and value Indigenous African Vegetables in their on terms and presents a stable platform for cultural analysis of overall food culture. Indigenous African Vegetables are symbolic sources of illumination that orient African people persistently with the system of meaning in their culture.

Every human society is culturally situated and at the core of every culture are issues of food resources availability. Indigenous African country vegetable has an exceptional place in African leisure. They differ to some degree across African cultures and regions on the basis of the amount of value and meaning. Women prefer to served them during gatherings. It is these latter factors that account for differences in the styles of food.

Food indigenous vegetable presentation varied from one house to another, boiling, and steaming is more common and cross cutting almost all the households. The principal made of food preservation applied by local people especially for seeds was sun dying.

There is need to preserve and promote locally appropriate processing techniques to minimize most cases and ensure regular suppliers of indigenous vegetables from the production areas to consumers in rural peri-urban and urban centers.

The easy perisherbility of indigenous vegetables poses major a challenge with distribution and marketing. As previously alluded, it has been Africans norm of processing leafy vegetables to make them available during period of shortages.
Drying is one of the solutions to the problem of perish-ability but does not satisfy the needs of a large promulgation of consumer's, particularly urban dwellers who prefer freshly harvest vegetables, further, not enough is known on how drying and reconstitution affect the nutritional quality of vegetables. There are also other food safety issues such as toxicity and microbial contamination that require research attention as strategies are put in place for the promotion of increasing consumption of these vegetables (Smith et al. 2006).

In the rural areas the conservation and use of indigenous vegetables resources begins with women. In some areas many aspects of cross cycle, including seed selection to planting, harvesting, storage and processing needs and welfare, including the cultivation or harvesting of food and medicinal plants determining which plant resources to conserve and use which cross verities to grow, which vegetable is more in demand in the local market need to be preserved are the responsibilities of the women.

For this reason, gender analysis and gender sensitive approaches are a core apart of conservation. Research in this area demand international producers' indicators for monitoring and mainstreaming gender sensitivity. Gender differentiated management of Agrobioversity provides a rich body of empirically more complete view of the extent value and cases of genetic resources by rural communities. However conservation strategies appear to focus mostly on male farmers.

CHAPTER THREE

THE SOCIO-ECONOMIC AND DEMOGRAPHIC CHARACTERISTICS OF THE RESPONDENT HOUSEHOLDS

The study was interested in examining the socio-economic and demographic characteristics of the respondent households in the study area using African indigenous vegetables for food security, nutrition and income generation in terms of age, gender, marital and employment status and education level distribution.

3.1 Age and Gender Distribution

An examination of the age and gender distribution of the respondent households who cultivated and used indigenous vegetables for food security, nutrition and income generation was important for the study because in most African communities the division of labor in farming activities is based on age and gender distribution of the household members. The majority of the respondents (64%) who cultivated and used indigenous vegetables for food security, nutrition and income generation were female headed households. Table 3.1 shows the percentage age and gender distribution of respondent heads of household.

Table 3.1: Percentage Age and Gender Distribution of Respondent Heads of Households

Total Number of Respondent Heads of Household (Male=18 Female=32)

Age Group (in Years)	Male	Female
< 20	2	3
20-40	4	7
40-50	41	42
50-60	29	28
>60	24	20
TOTAL	100	100

Table 3.1 shows that the majority (>90%) of the respondents, both male and female, were in the age groups of 40 years and above. Interviews with respondents and information from focus groups discussions showed that the cultivation of indigenous vegetables was not appealing to most young people. They preferred to go to urban areas to look for salaried jobs.

The study found that the largest proportion (74%) of the respondent heads of households, especially the female heads of household were married. Interviews with the respondents including focus group discussions revealed that the growing of indigenous vegetables was more appealing to married heads of households because most of them were not employed; hence they had enough time to participate in the cultivation of such crops. In addition, as de facto heads of households, the husbands were working as migrant laborers in urban areas and mines. The growing of vegetables complemented their household income, food and nutritional security.

3.2 Occupational Status of Respondent Heads of Households

In many cases, the mother will be the only parent in the household because the father is often forced to find a job away from home to supply the household with an income. Often, the income made by the father did not reach home to the family because he uses it

for his own living. Unfortunately, while there was a definite correlation between the status and income of the mother and the welfare of the household, there was little correlation between the income of the father and the welfare of the household. It was on the basis of the above that the study wanted to establish the occupational status of the respondents. The results are reflected in Table 3.2.

Table 3.2: Percentage Distribution of the Occupational Status of Respondent Heads of Households

Total Number of Respondents Male = 18, Female= 32

Occupational status	Male	Female
Employed	8	2
Unemployed	70	80
Pensioners	14	5
Others	8	13
Total	100	100

Table 3.2 shows that the majority (70% male) and (80% female), of the respondents were unemployed. Interviews with respondents indicated that while male respondents had alternatives of looking for employment in the commercial farms, mines and urban areas. Most of the female heads of households who were unemployed had limited employment opportunities hence relied on subsistence farming including the cultivation of local vegetables to complement household income and food supply. Their situation was aggravated by the low level of education. The study found that the majority (86%) of the respondent female heads of household did not have educational level beyond primary education.

3.3 The Household Size and Employment Status of the Respondents

The size of a household, especially the number of dependants with no regular income tends to have an impact on its welfare in terms of food and nutritional status. This is mostly the case in a situation where there is only one bread winner or there is no regular household income to buy enough nutritious food. The study found that the majority of the respondents in both communities, i.e. Sannieshof 58 % and 62% in Lokgopung, had 6 or more dependants, who's ages ranged between 4 to 80 years of age. The households

were composed of very young children and very elderly people. Over 60% of the respondent female heads of household in both communities reported that they were married but none was employed. They depended on remittances from their husbands who were working either in the white commercial farms, mines or urban areas.

Interviews with respondents indicated that their low level of education limited their employment chances within and outside the community.

The majority of them, 69% in Sannieshof and 83% in Lokgopung did not go beyond primary school education. Information from focus group discussion showed that like in other African communities within and outside South Africa, women in the two communities were at an additional disadvantage when it comes to education and training because the girls in a household were traditionally expected to help with the daily household chores, such as fetching water, which can sometimes be over an hours walk away. They did not have enough time to attend school.

CHAPTER FOUR

AFRICAN INDIGENOUS VEGETABLES IN HOUSEHOLD FOOD SECURITY AND NUTRITION

4.1. Conservation of indigenous leafy vegetables for poverty alleviation

In her study of the use and conservation of indigenous leafy vegetables in South Africa, Erika van den Heever (2003) states that South Africa is a country of national food self-sufficiency, and is able to export food. However, hunger and malnutrition are still found in many rural and urban areas. It has been estimated that in South Africa over 3 million people under the age of 15 are suffering from malnutrition. Vegetables are of great importance in helping to alleviate this problem as they contribute significantly to the amount of calories and other nutrients in the diet. The scarcity of vegetables, or their scarcity in the diet, is a major cause of vitamin A deficiency, which causes blindness and even death in young children throughout the semi-arid and arid areas of Africa (Okigbo, 1990).

Exotic vegetable species cannot be grown under the harsh climatic and resource-poor conditions encountered in many of the rural areas where these problems occur. However, there are a number of indigenous and traditionally grown plant species which could help to alleviate this situation. The use of indigenous plant foods in arid and semi- arid regions, such as most of the North-West Province, especially during periods of drought, contributes to food security and provides dietary supplements to the staple diet. Many of these indigenous plants, few of which are grown under improved husbandry, are eminently well suited for cultivation in the large areas of South Africa including the North-West Province which has low agricultural potential due to low or unreliable rainfall, poor soils and steep topography (Cunningham et al, 1992).

The following sections present:

(i) the different types of African indigenous vegetables cultivated and used by the respondent households in the study areas for food security and nutrition;

(ii) the existing knowledge and attitudes of the respondent households towards the cultivation and use of African indigenous vegetables for food security and nutrition;

(iii) the advantages and limitations of African indigenous vegetables in food security and nutrition compared to exotic vegetables

4.2 The Types of African Indigenous Vegetables Cultivated and Used by Respondent Households for Food Security and Nutrition

In this study an indigenous crop refers to a crop species or variety native to South Africa, or to a crop introduced into the country where over a long period of time it has evolved, although the species may not be native. Archer (2000) defines vegetables as plants which are consumed in addition to starchy basic food in order to make it more palatable.

Home gardens have several features that make them a viable and important option for varieties that were once more widespread in the large agro-ecosystems. Farmers often uses those that may offer important nutrient combinations, figure prominently in local food culture, or have experimentation and introduction of new cultivars arising from the exchange and interaction between processes of domestication of plant species. It is therefore crucial to understand the dynamics conservation of global Agrobiodiversity.

Below are a few examples of African vegetables (leaves, tubers and legumes) that have potential as food and cash crops that continue to be overlooked by scientists and policymakers that can help overcome malnutrition. These food, foster rural development, especially among women and rural farmers, and create sustainability. According to Anand (2005), indigenous crops have received limited research attention to date. At this stage, little is known about the role of these vegetables in the overall food acquisition system of vulnerable people in different parts of the country, especially in terms of their contribution to the intake of important micronutrients. Most of sub-Saharan agriculture falls within the resource poor category characterized by
marginal soils that are mainly poor in soil nutrients. Resource poor South African farmers are mainly subsistence farmers who use a mixture of traditional and conventional practices. The importance of indigenous knowledge and traditional crops in the survival strategies of rural people has only recently been recognized.

Due to the multiple uses of plant parts that can be eaten, traditional crops play an important part in food security. These plants have previously been ignored by both research and extension, due to their informal cultivation and harvesting practices (Aman, 2000).

The study wanted to identify the different types of indigenous vegetables used by the respondent households for food security and nutrition. The results are shown in Table **4.1**

Table 4.1: The Types of African Indigenous Vegetables Cultivated and Used by Respondent Households for Food Security and Nutrition

Indigenous Name	English Name	Biological Name	Food and Nutritional Uses	Medicinal Uses
Lerotho	Spider Flower	Cleome Gynandra	Edible vegetable in summer	Roots used for fever and relieve scorpion stings; leaves used to cure ear pains. Eating vegetable is believed to reduce dizzy spell in pregnant women and easing child birth. It is also traditionally eating by boys after circumcision to restore blood supply as it contains high level of iron.
Thepe	Amaranth	Amaranthaceae	Edible vegetable in summer	Amaranth oil may be used as a topical ointment for burns, wring less, rashes

				taken in hence digestion and soothe the stomach
Ligusha	Jew's mal low	Corehorus olitorius	Shiny black purple fruit seed are used to make jam, edible vegetables in both winter and summer	N/A
Monyaku Makopuntji	Pumpkin mellws	Lulurbitapepo	Edible vegetable in summer	Seed oil used to promote health
Nawa ya setswana (Morogo wa dinawa)	Cowpeas	Vigna unguilata	The leaves are dried for latter used and can be eaten dry or fresh	N/A
Lethotho	Nightshade	s. nigrum complex	The leaves are dried for latter used and can be eaten dry or fresh	N/A
Leswe	Wild spinash	Chenopodialeae (fimily)	The leaves are dried for latter used and can be eaten dry or fresh	N/A
Maboa	Anthill mushroom	Not yet identified (lycoperdonspp)	They contain essential amino acides potassium some Vitamin B and minerals	N/A

Source: Interviews with Community Knowledge Holders in the Study Areas

N/A = Not Applicable

According to interviews with the community knowledge holders, the above mentioned indigenous vegetables (Table 4.1) were adapted to a wide range of climate and soil conditions but require relatively high soil moisture for optimum growth. It was, however, stated that extended periods of drought can kill the vegetables.

Direct seeding of these vegetables was common when the seeds were plenty. It was argued by the knowledge holders that transplanting delayed harvesting. Good drainage was essential for plant survival and growth. Pest damage was usually less, except for plants that were at a harvesting stage. According to the knowledge holders, inter-cropping may reduce pest destruction. Only few diseases attacked indigenous vegetables.

Most of the vegetables could be harvested 30 -60 days after planting, depending on the vegetable type. Vegetables such as amaranth could be harvested several times hence ensuring household and community food security and nutrition. During the field study it was observed that young leaves were picked every two weeks. It was pointed out by the community knowledge holders that frequent harvesting delayed flowering, hence prolonged the harvesting period. They stated that seeds should be collected from healthy, disease – free plants. The seeds could be dried further in the shade for 3 – 5 days.
Properly dried seeds should be kept in a closed container to avoid insect damage. Traditionally, ash was mixed with the seeds to prevent insect damage. This was an indigenous technique of seed preservation.

Table 4.1 shows the various types of indigenous vegetables used for various purposes including food, nutrition and medicine. Interviews with respondents revealed that most of these plants were available during the rain season in summer. Most of them were collected wildly during the rainy season in summer. Van den Heever (2000) elaborates that the use of wild plants as leafy vegetables is very common in most parts of South Africa, both rural and urban, especially during the summer rains. In the rainy season indigenous vegetables were consumed daily to several times a week due to their abundance. During the dry season, the frequency of vegetable consumption span from once or twice a week. It is also observed that the consumption of African indigenous vegetables is higher among poor households. It was found that poor households relied more on African indigenous vegetables as a sources of relish than wealthier households. The latter have the option of buying exotic vegetables from the market.

The indigenous vegetables were collected in the back yard as well as outside the homestead. Approximately 80% of all households in the study communities collected indigenous vegetables during that time, showing the importance of wild food crops for overall consumption. The crops most frequently collected outside the homestead, listed in order, are amaranth, spider flower plant and cowpea.

4.3 The Existing Knowledge and Perceptions of Respondent Households Towards African Indigenous Vegetables for Food Security and Nutrition

The study found that social networks among relatives, neighbours, and fellow farmers played a key role in determining access to seed information for the indigenous vegetables. It was also observed that some indigenous vegetable species were more sought after than others because of their qualities as indicated in Table 4.2.

Table 4. 2: Examples of Indigenous Vegetables Qualities Identified by Respondents

Type of Vegetable	Cultivation	Consumption
Amaranth	Early maturity Long production cycle Repeated harvesting Little input required High yield (large leaves) Low susceptibility	Short cooking time Good taste Can be dried Micronutrient content Low water content
African nightshade	Early maturity Easy harvesting Long production cycle Little input required Low susceptibility	Short cooking time Nutritious
Spider Flower	Cleome Gynandra	
Jew's mallow	Early maturity long production Repeated harvesting little input required (fig yield)	Long cooking time bitter taste. Can be dried. Micronutrients contents.
Pumpkin	Early maturity long production Repeated harvesting little input required high yield.	Long cooking time bitter taste. Can be dried. Micronutrients contents.
Cowpeas	Early maturity long production Repeated harvesting little input high yield.	Long cooking time bitter taste. Can be dried. Micronutrients contents.

According to Kwapata and Maliro (1989), the fresh leaves are edible portion for nearly all vegetable recorded above. There is little variation in the method of preparation for consumption. Boiling of spider flower leaves may reduce Vitamin C content while drying reduces the Vitamin content. The leaf absorbed acid content signinificantly increase total leaf phenolics decrease. These phenolic compounds give the vegetable an astringent taste.

There are several important indigenous vegetable whose leaves are harvested to make relish which can be cooked dried and store. However, Madisa and Tshamekano (2000) emphasize that these leaves are highly popular and nutritious, having protein contents of up to 36%. Wegneterm and Peers indicates the vitamin content of the indigenous vegetables depends on the age of the plant and indigenous vegetable contains both Vitamin A and Vitamin C. The vegetable complements the low calcium, magnesium and iron contents of other staple food.

4.4 The Existing Knowledge and Attitudes of the Households in the Study Areas Towards African Indigenous Vegetables for Food Security and Nutrition

African Indigenous vegetables have been a traditional part of cropping systems, especially home gardens (Midmore et al, 1991). The cultivation, utilization and acceptability of African indigenous vegetables do not usually pose problems because they are familiar to the local population. Selected amaranth leaves and stems make boiled vegetables with soft texture, mild flavor and no trace of bitterness. In the North West Province indigenous vegetables are a mainstay of the traditional cuisine. Leaves, young stems, and young inflorences are eaten as pot herbs.

Although much of the pigment leaches out on boiling, the leaves retain a pleasant green colour. They soften up readily requiring only few minutes cooking which helps avoid excessive nutrients loss. The leaf could also be tossed into soups and stews. The boiled leaves may be rubbed through a fine sieve and served as a purée. Very young leaves may be used in mixed salads.

Amaranth is a shade loving crop so it can be planted around various taller plants such as maize, corn or fruit trees. Women are the prime producers and collectors in the North West Province.

Regardless of the climate locally, insects are the major constraints in the cultivation of indigenous vegetables. Most beetles feed on African indigenous vegetables. This is a problem without a universal solution, and one useful solution widely practiced is to cover the seed beds with screen fine enough to keep insects out.

The plants are sometimes susceptible to viruses as well as fungal maladies but well decomposed manure can strengthen the plant. When planting, to ensure good germination, the seeds must be close to the soil surface as they are very fine. The seeds of Amaranthas and Gleome Gynanandra are very fine. They need to be protected by mulch made of grass. They both take 14 to 21 days to germinate since the seeds are tiny. Sometimes farmers mix them with sand or maize meal when planting them for even spreading.

Indigenous African vegetables consumption reflects cultural backgrounds and experiences, folklore and how African people perceive the value of indigenous vegetables in their on terms and presents a stable platform for cultural analysis of oral food culture. Indigenous vegetables are symbolic sources of illumination that orientate African people persistently with the system of meaning in their culture.

Every human society is culturally situated and at the core of every culture are issues of food recourses availability. Indigenous African country vegetables have an exceptional place in African luisire. They differ to some degree across African cultures and regions on the basis of the amount of value and meaning, women carted in the symbol of food and social class of the person being served. It is these latter factors that account for differences in the styles of food. Indigenous vegetable presentation varied from one house to another, boiling, and steaming are more common and cross cutting almost all the households. The principal made of food preservation applied by local people especially for seeds was sun drying.

There is a need to develop and promote locally appropriate processing techniques to minimize most cases and ensure regular supplies of indigenous vegetables from the production areas to consumers in rural peri-urban and urban centers. The easy perisherbility of indigenous vegetables pose major challenges with distribution and marketing. As previously alluded, drying has been an African way of processing leafy vegetables to make them available during period of shortages.

Drying is one of the solutions to the problem of perisherbility but does not satisfy the needs of a large population of consumers, particularly urban dwellers who prefer freshly harvested vegetables. Moreover, not enough is known on how drying and reconstitution including cooking dried vegetables affect the nutritional quality of the vegetables. There are also other food safety issues such as toxicity and microbial contamination that require research attention as strategies are put in place for promotion of increasing consumption of these vegetables.

4.5 The Advantages and Limitations of African Indigenous Vegetables in Food Security and Nutrition Compared to Exotic Vegetables

The advantages of African Indigenous vegetables for food security and nutrition compared to exotic vegetables lie in the fact that they have been proved to be excellent sources of vitamins and minerals. The introduction of exotic vegetable species has gradually displaced indigenous food crops in many local diets. It has also meant a loss of indigenous knowledge systems related to the cultivation and utilization of these crops for food security and nutrition. In some cases, with increased income from exotic vegetables some rural subsistence households tend to depend more on these new food crops hence increasing their dependence on the market and vulnerability to market forces and price fluctuations in obtaining adequate food and to meet their nutritional requirements (FAO, 1989, Richards, 1990, Warren et al; 1995).

The study observed that the limited supply of vegetables in the study areas during the off-season and higher market prices are among the key factors that limit the vegetable consumption rate in the North West Province.

Interviews with community knowledge holders including local farmers showed that the cultivation of indigenous vegetables could make a positive contribution to the reduction of food insecurity and malnutrition in the local communities of the province. This is due to the fact that they are well adapted to harsh environmental conditions of the local areas and are generally resistant to pests and pathogens. Currently indigenous vegetables are underutilized and mostly not cultivated. According to community knowledge holders, indigenous vegetables could be selected as a partial substitute for other cultivated commodities to alleviate nutrient deficiencies. They need little or no input to grow on the other hand exotic vegetables are expensive to produce as they need chemicals.

The above assertion in supported by AVRDC (2003) who state that indigenous vegetables are often easier to grow, more resistant to pests, and acceptable to local tastes. They further indicate that although indigenous vegetables are beginning to get the attention they deserve, they are at risk in many countries because the traditional varieties are being replaced by a few high yielding commercial exotic varieties and once an indigenous variety is lost, it is lost forever.

Interviews with the community knowledge holders in the study communities revealed that indigenous vegetable have unique advantages within the local farming system. They grow quickly and can be harvested within a short period of time hence providing food security and make them useful in nutritional intervention programmes. During the rainy season when indigenous vegetables are plenty some communities preserve them by drying them for use in times of scarcity.

Interviews with key persons in the study communities revealed that when the variety in the food base of food-insecure communities narrows, there are serious nutritional consequences.

The consumption of certain minerals and vitamins is adversely affected. They raised the concern that the production and utilization of traditional food plants in the local communities is declining tremendously and hence the dietary diversity is getting narrower with time. They attributed this to the introduction of high yielding exotic crops which are getting popular because of their production and processing convenience or the prestige attached to their use.

They added that the exotic crops are also often high on the agenda of government and development agencies, breeding programmes including commercial seed producers, and their market value is high. Local species have not received such attention, although their adaptability, nutritional value and place in the traditional diet justify such attention. Although users and promoters of indigenous food plants are well aware of these facts, much more must be done by plant breeders and commercial seed producers to rectify the situation.

Traditional food plants have numerous advantages, especially in terms of household food security. In addition to broadening the food base, they increase the food supply and add variety to the diet. They are also beneficial for ecological reasons, as they increase crop productivity, conserve the soil and increase soil fertility. Many traditional crops, such as mellows, amaranth and cowpeas, are interplanted with maize or other cereal crops to act as ecological barriers to disease. When used as a ground cover, traditional vegetables also help prevent soil erosion, reduce evaporation and suppress weed growth. Grown as green manure and ploughed into the soil, they increase the soil's organic matter and improve its structure. Legumes also fix atmospheric nitrogen, enriching the soil for the following crop or for nearby plants.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

This Chapter provides the conclusion and recommendations from the study.

5.1 Conclusion

Although South Africa is a country of national food self – sufficiency and is able to export food, hunger and malnutrition are still found in many rural and urban areas. The study found that African indigenous vegetables are of great importance in helping to alleviate this problem. The small scale farmers, especially women, most of them being unemployed, cannot afford to purchase the expensive exotic vegetables from local markets. Indigenous vegetables are the main source of nutrition and food security for them. However, in spite of this contribution to food security and nutrition, the cultivation of indigenous vegetables is rarely appreciated and supported by government. Most people due to the influence of western eating habits consider indigenous vegetables as a poor man's food to be eaten in times of food shortage. The introduction of exotic plants species has gradually displaced indigenous food crops in many local diets. It has also meant a loss of indigenous knowledge systems related to cultivation and utilization of these crops.

5.2 Recommendations

The study recommends the following:- There should be extensive educational campaign to raise awareness and knowledge among the public and government on the importance of indigenous vegetables;

- Researchers need to research more about the nutritive value of indigenous vegetables for sustainable community livelihood and development.
- Policy makers should incorporate the production of indigenous vegetables into existing and future food security and nutrition policies;
- Government should facilitate the promotion of local and external markets for indigenous vegetables as part of poverty eradication policy frameworks.

BIBLIOGRAPHY

Alim & Tsou, CS. 1997. Combating Micronutrients Eleticuncy Through Vegetables A Neglected Food Frontier, in ***Asia Food Policy,*** 22(1) 17-13.

Aaronson, S. 2000 . ***The Cambridge World History of Food***, Cambridge: Cambridge University Press.

Aman, R. 2000. ***Indigenous Food Plants Programme: Using Locally Available Edible Species to Enhance Community Health, Provide Income and Conserve Biodiversity,*** National Museum of Kenya.

Anand, G. 2005. Traditional Societies, In ***East Africa Use Wild Plants For Different Purposes And Means To Survive,*** Nairobi: RDC.

Africa Poverty debate http//www.Africa focus.org/does 04/big 0417 php.

Archer, D. 2000. ***A World of Food: Tastes and Taboos in Different Cultures***, LA: University of California..

AVRDC. 2002. ***International workshop proceedings***, Arusha, Tanzania 5-8 May 2002.

Babu, S.C & Rajasekaran. 1991. ***Agro forestry attitude towards risk and nutritional availability. A case study of South India farming systems***. London: Sage.

Bekele, T et al. 2000. ***Useful Shrubs and Trees for Ethiopia: Regional Soil Consideration unit/s,*** Nairobi: RSCU.

Bekele, T. 2000. ***Useful Shrubs and Trees for Ethiopia: Regional Soil Consolidation Unit:*** Nairobi: RSCU.

Brown, L. 1996. ***Tough Choices Facing the Challenges of Food Security***, NY: DASE.

Butt, R . 2006. ***Poverty And Rural Development In South Africa Walk Economy.*** Pretoria: SOG .

Cole, J. 1999. ***Amaranth: From the Past for the Future***, Rodale Press.

Conrad, A 2002. ***Case Study: Introduction Definitions and Case Study Examples***, Boston: CSDT.

Coetzee, R. 1982. ***Fauna Food from Africa: Roots of Traditional Food Culture***, Pretoria: Butterworth.

Cunningham, et a . 1992. ***The Indigenous Plant Use Programme***, Pretoria: Foundation for Research Development.

Duke, J. 1992. ***Handbook of Edible Weeds***, London: CRC Press.

Engle & Altovores. 2000. ***Nutritional Value of Fresh Leafy Vegetables,*** Nairobi: RSCU.

Delee J. 1992. ***Handbook of Edible Weeds,*** London: ERC Press

Erica van den Heever. 2000 .***The Use and Conservation of Indigenous Leafy Vegetable*** in South Africa Plant institute, Pretoria :Agricultural Research Council

FAO .2000. ***Human Nutrition in Developing World***, Rome: FAO.

Grubben, G. 1991. ***Genetic Resources of Amaranth: A Global Plan of Action***, Rome: International Board for Plant Genetic Resources.

FAO. 1992. ***Rural Poverty Alert Challenging Science And Technology,*** Pretoria: Foundation for Research Development

FAO. 2005. ***Healthy Eating*** 2005 htt://wwwbrokenarronrnch com/articles/health eating html.

Gari J.A. 2001. Agro-biodiversity Food Security And HIV/AIDS Mitigation In Sub-Sahara Africa in ***Palanda , International Cooperators Guide***, Asia: SL

Gbile, S. 1998. ***Tropical Plant Breeding Editions***, Quaeu: SI

Guilt, P. 2002. ***The Hidden Harvest The Value Of Wild Resources In Agricultural System. A Summary***, London: IE

Kwatapa M.B and Maliro M.F. 1989. ***Indigenous vegetable in Malawi, Zomba:*** IPC

Machakaire, A. 2006. ***Agronomic and Nutrition Studies Of Two Indigenous Vegetables***. International Horticultural Congress.

Madisa M.E and Tshameka M.E. 2006. ***Conservation And Utilization Of Indigenous Vegetables In Botswana***, Gaborone: Ministry of Agriculture-Botswana.

Midmore A.J. 1991. Household Gardening Project in Agriculture and Future Direction in ***Technical Bulleting Vegetable Research and Development***, 7 (2), pp 4-8.

John, A. 2005. ***Combating Malnutrtion and Gender Inequality in East Africa***, Iowa: University of Iowa Press.

Kaufmann, CS. 2001. ***Vegetable Amaranth in Summary***, Emmaus: Rodale Press.

Macbeth, H. 1997. ***Food Preferences and Taste: Continuity and Change***, London: Sage.

Mathenge L. 2006. ***Nutritional value and utilization of indigenous vegetable in Kenya.***

Midmore DJ, Wiwez, V. and Venkalaram, R .1991. Household gardening project in ***Asia Past Experience And Future Directions. Report Of A Workshop*** Sponsored By The Asian Vegetable Research And Development Centre. Taiwan.

Musinguzi E. 2006. Utilization Of Indigenous Food Plants In Uganda. A Case Study Of S.W Uganda, in ***African Journal Of Food Agriculture Nutrition***,Vol.6 No.2: pp 40-52

North-West Provincial Department of Social Development Annual Report ,2004.

Okigbo, B.N. 1990. ***Vegetable in Tropical Africa Vegetable Research And Development In SADC Countries***, Harare: SADC.

Oniang'o R K, Mutuku JM and SJ Mlaba. 2003. Contemporary African Food Habits and Their Nutritional and Health Implications in Asia- ***Pacific Journal of Clinical Nutrition,*** 16 (7): 264-291.

Ottowa, O. 2006. ***Rome Declaration on World Food Security***, Ontario: Canada

Pottier, J. 1999. ***Anthropology of Food: The Social Dynamics of Food Security***, London: Sage.

Owuor, OB and Angara E.O. 2007. ***The Value Of Leafy Vegetable: An Exploration Of Africa,*** Nairobi: Tolkcore.

Ramalo, S. 2000. Adolescence Pregnancy in Southern Africa, in Legacy ***Magazine***, Spring (2000), pp. 31-39.

Rubaihayo E.B. 1994. Indigenous vegetable of Uganda in ***Africa crop science conference, Africa crop science Society, Vol.*** 1, pp 120-124.

Rubaihayo E.B. 2002. The Contribution Of Indigenous Vegetable To Household Food Security in ***IK Notes.***

Rubaihayo ED. 2002. The Contribution of Indigenous Vegetable to Household Food Security ***in IK notes,*** 44 May (2002) from World

Russel, J. 2001. Forage Nutritive Value of Various Amaranth Species at Different Harvest Dates, in ***Crop Science***, 41: pp 466-472.

Saguti, A. 2006. Violent Conflict and Chronic Poverty in Sub-Saharan Africa, Paper Presented at Workshop on *Poverty and Sustainable Development in Eastern Africa,* Mzumbe University, Tanzania 13-15 March 2006.

Schulte, E. 1999. Amaranth, in ***Alternative Field Crops Manual***, Centre for Alternative Plant and Animal Production, University of Wisconsin, Madison: University of Wisconsin Press.

Simopolous, A. 2000. ***Plants in Human Nutrition***, London: Karger.

Strickland, S.S. 1993. ***Nutritional Anthropology: Prospects and Perspectives***, London: Smith-Gordon.

Smith F.I and Pablo, A. 2006. ***African Leafy Vegetables. Their Role In The World Health Organizations Global Fruits,*** Nairobi: Rural Outreached Program

Tregold N.H.1986. ***Food Of Zimbabwe,*** Bulawayo : Mambo Press

Wide Web http://www.wouldbank org/africaik/index.htm.

Sysop, P. 2006 ***Combined Indigenous Scientific Knowledge : Can Assist Agriculture,*** Nairobi: PSA

Van den Heever, E. 1992. Potential Vegetable and Medicinal Uses of Traditional Crops in ***South Africa Aeta Horticulture Home***.

Van den Heever E. 2000. ***The Use and Conservation of Indigenous Leafy Vegetables,*** Pretoria: Agricultural Research Council.

Van den Heever, E. 2005. ***The Use and Conservation of Indigenous Leafy Vegetables in South Africa***, Pretoria, ARC.

Warren, D.M. 1990. ***Indigenous Knowledge Systems and Development: Background Paper for Seminar Series on Sociology and Natural Resource Management***, Washington DC: World Bank.

Whiting, A. 2002. ***A Cross-Cultural Nutrition Survey of 118 Societies of Major Cultural and Geographical Areas of the World***, School of Public Health, Boston: Harvard University Press.

Watson, J. 2005. ***The Cultural Politics of Food and Eating***, N.Y: Blackwell.

Weismantel, M.J. 1998. ***Food, Gender and Poverty in Africa***, University of Pennsylvania Press.

Wikipedia . 2005. ***Subsistence Farming.***

Young, E.M. 1997. ***World Hunger***, London: Routledge.

Yudkin, J. 1995. ***The Penguin Encyclopedia of Nutrition***, London: Penguin Books.