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THE COMMON ZAMBIAN FOODSTUFF, ETHENICITY, PREPARATION AND NUTRIENT COMPOSITION OF SELECTED FOODS REPORT

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RESEARCH REPORT

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ACRONYMS

AOAC	Association of Official Analytical Chemists
CFA	International
CP	Crude Protein
CSO	Central Statistical Office
DNA	Deoxyribonucleic Acid
EE	Ether Extract
FGD	Focus Group Discussion
FHANIS	Food Health and Nutrition Information Systems
GE	Gross Energy
NCSR	National Council for Scientific Research
NFNC	National Food and Nutrition Commission
NISIR	National Institute of Industrial and Scientific Research
PLA	Participatory Learning Activities
PRA	Participatory Rural Appraisal
RDA	Required daily allowances
RNA	Ribonucleic Acid
SPSS	Statistical Programme for Social Sciences
SAP	Structural Adjustment Program
TDRC	Tropical Diseases Research Center
UNZA	University of Zambia

GLOSSARY

Common Name	Scientific Name
Amankolobwe	*Cucubitus*
Avocado seeds	*Persea americana*
Baobab	*Adansonia digitata*
Bean Dark Red	*Phaseolus vulgaris*
Bean leaves	*Phaseolus lunatus*
Black jack	*Bidens pilosa*
Black nightshade	*Solanum nigram*
Bulrush Millet	*Eleusine aflicana*
Busala	*Dioscorea hirtiflora*
Cabbage	*Brassica oleracea var. capitata*
Cassava	*Manihot esculenta*
Cat's whiskers	*Cleome gynandra*
Chimowa	*Amarathas dubis*
Cocoa yam	*Dioscorea spp*
Corky-bark monkey orange	*Strychnos coccolliodes*
Cow Pea Leaves	*Vigna unguiculata*
Cucumber	*Cucurbita spp*
Cucumber leaves	*Cucumis sativus*
Dried sour rosella	*Hibiscus meeusei*
Fig tree fruits	*Ficus carpensis*
Garden eggs	*Solanum macrocarpon*
Green gram	*Phaseolus aureus*
Groundnuts chalimbana	*Arachis hypogaea*
Guava	*Guava*
Kasona yam	*Dioscorea spp*
Lumanda	*Hibiscus meeusei*
Makulu red (groundnuts)	*Arachis hypogaea*
Mango	*Mangifera indica*
Masau	*Ziziphus mauritania*

Mbambara nuts	*Leguminosae subterranea*
Millet	*Eleusine africana*
Mubula	*Parinari curatelifolia*
Mulberry	*Morus nigra*
Mundioli (T)	*Erythrococca menyharthii*
Mushroom	*Lactarius spp (Russulaceae)*
Mushroom from wood	*Schizophyllum commune*
Mushrooms	*Agancus campestris*
Njamva yam	*Dioscorea spp*
Okra	*Hibiscus esculentus*
Orange	*Cirtus Sinensis*
Pineapple	*Annas comosus*
Pumpkin	*Cucumeropsis edulis*
Pupwe	*Zanthoxylum chalybeum*
Rape	*Brassica carinata*
Rape	*Brassica napus*
Red rosella	*Hibiscus meeusei*
Rice	*Oryza sativa*
Sausage tree	*Kigelia africana*
Sesame Seeds	*Ceratotheca sesamoides*
Sindambi	*Hibiscus meeusei*
Sorghum	*Eleusine aflicana*
Sorghum	*Sorghum lincolor*
Sweet Potatoes	*Ipomoea batatas*
Termite Mushroom	*Termitomyces spp*
Tomato	*Lycopersicum esculantum*
West African yam	*Dioscorea spp*
Wild delele	*Corchorus tridens*
Wild pear	*Dombeya rotundifolia*

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EXECUTIVE SUMMARY

Food nutrient composition and food diversity have important implications on the status of the populations consuming them. In Zambia the nutrition situation is deteriorating as represented by important child growth indicators such as cases of severe malnutrition, stunting and wasting. In order for nutritional intervention programmes to be done objectively there is need to establish the nutrient intakes of the concerned population and this requires the use of food composition tables.

The current Zambian food composition tables are not inclusive of many important common local foods and it was last updated in 1987. In addition, many other local foods and some new foods have come on the scene, but their food value is not known, hence do not appear in the tables as well. Therefore, main objective of this research project was to address the urgent need to review, evaluate and update the current Zambian food composition tables and include other commonly consumed foodstuffs.

Updating the Exiting Tables with Generated Institutional Data

The desk study on data on food composition generated by various institutions in Zambia showed that no meaningful food composition analysis had been done on new foods other than routine specific nutrient analyses on some food samples used in the food industry e.g. soybean, sunflower or maize. The data had many gaps and no consistent information on the methods and measures of analyses. Thus, this data was disqualified for entry into the revised food composition tables.

Identification of Foodstuffs not in 1987 Food Composition Tables

The three ecological zones of Zambia were visited and two randomly selected districts per zone included Siavonga and Nyimba in zone I, Mongu and Chibombo in zone II and Mwinilunga and Kasama in zone III. The outputs per region included Food Calendars depicting availability and seasonality (Annex 1). A total of 109 foodstuffs were identified in Zone I, and 143 in Zone II and 150 in Zone III.

Thus a total of 256 common foodstuffs were identified from the six districts visited by the researchers. The communities prioritized 158 foodstuffs according to preference, importance and availability as shown in tables 1-7 and these were further prioritized by zone by the researchers to come up with a composite list of 55 prioritized foodstuffs (Table 8) to be analyzed. Then some of the fifty five foodstuffs were processed by either boiling or adding groundnuts in the case of relishes, thus bringing the total samples for analysis to 93. Thus a total of 201 common food stuffs (tables 9-14) were not analysed due to financial constraints.

Preference was usually influenced by availability that also influences importance of the foodstuff especially in hunger/lean periods any foodstuff becomes important. The lists were also useful in prioritizing samples for analysis. Samples in season were collected for processing and photographs of samples *in situ* were taken for reference (Revised Food Composition tables, 2004)

Indigenous Methods Of Food Processing, Preservation And Utilization

Annex 2 presents Food processing and utilization methods from the different areas studied.

Processing was almost limited to pestle and mortar, and grinding stone and beer brewing. Hammer mills are also available for maize and sorghum (maila). Bulrush millet (Nzembwe) is exclusively stone ground on a daily basis for the desired fineness and fresh flavour. Some vegetables are also ground and potash and soda are used for flavour and softening, especially the tree leaves.

The staples are made into hard (nshima) or soft porridge. Relishes are eaten with nshima. Leafy relishes are usually ground and salt, soda/potash and/or groundnuts added if available. Very little oil is used due to non-availability, expense and access. Beverages from the cereals staples include sweet beer (chibwantu) and hard liquor or alcoholic beverages including seven days (opaque beer) and locally distilled spirits like kachasu.

Nutrient Composition of Prioritized Foodstuffs

The foodstuff nutrient composition analyses of was done at the School of Agricultural Sciences by the Food and Nutrition Laboratory of Departments of Animal Science and Food Science and Technology at University of Zambia.

The Table 15 presents the nutrient composition of the selected foodstuffs that were not in 1987 food composition tables on air-dry basis. The table has been broken further into several tables comparing the nutrients of some important common foodstuffs. These comprise the raw relishes, relishes boiled with or without groundnuts and the wild fruits.

The nutrient composition of the relishes varied between variety (e.g. among leafy vegetables) and species (leguminous, ordinary none leguminous, common relish weeds and those of animal origin).

The green leafy vegetables varied in protein content which was much higher than some of the beans and similar to or higher than groundnuts (table 16). The cereals, tubers and roots had lower protein levels in that order (table 8 and . Cassava leaves had the highest crude protein content followed by the black jack and bean leaves. The different caterpillars had different crude protein levels but all were higher (35-58.6%CP) than the leafy vegetables (21-35%CP) and beans (18-24.5%CP). The mushrooms also showed appreciable amounts of crude protein content (18-30.6%CP).

The caterpillars showed higher crude oil content (7.6-24.5% EE) and Gross Energy (4.8-6.1 kcal/g) but were less than groundnuts (39.7 EE and 6.5 Kcal/g) respectively.

Cassava leaves showed very high levels of apparent vitamin C (ascorbic acid) than all the other foodstuffs. Some vegetables such as pumpkin, sweet potatoes leaves and black jack leaves contained high apparent iron.

Boiling tended to reduce crude protein, crude oil, Gross Energy and vitamin C but showed an increase in apparent iron levels in selected common vegetables (Table 16).The addition

of ground nuts with or without sodium bicarbonate reduce vitamin C to trace levels that were not detectable.

Adding Ground nuts increased the protein (from 18 % in boiled – 32% CP) and oil (from 3.2-7.1 to 32-40.1% EE content and Gross Energy as consequence of increased oil.

The fruits analysed showed variability in nutrient composition. The Mungongo fruit had high protein and oil content at 23.5% and 57.4% crude protein, respectively and followed by Muzauli (12.1% CP and 35.1% oil, respectively). Both fruit trees were from Western Province and are used extensively as condiments in various dishes. Muzauli was used to give yellowish co lour, aroma and oil to the sweet potatoes and relishes. Ngai and Masau, which are both sweet and sour fruits, had high quantities of vitamin C, 303mg and 290mg, respectively. Except for Mango and Ngai fruits that had low iron content, the rest had comparatively higher iron content.

Influence of Ethnicity and Cultural Food Habits on Nutrition of People in Zambia

Zambia's contemporary culture is a blend of values, norms, material and spiritual traditions of more than 70 ethnically diverse people. There are seven main tribes and languages blending together the 70 dialects. These are Lozi, Bemba, Ngoni, Tonga, Lunda, Luvale and Kaonde. The employment opportunities in mining and associated industries have caused Zambia to be one of the most urbanized countries in Africa (54% people leave in urban areas). About one-fifth of the 10 million national population lives on the Copperbelt and an estimated over 2 million people live in Lusaka, the capital. During the colonial period, the process of industrialization and urbanization saw ethnically different people brought together by economic interests. This, as well as the very definite influence of western standards, has generated a new culture. Many of the rural inhabitants however, have retained their indigenous and traditional customs and values. Rural lifestyles are highly dictated by the surrounding natural resources that depend on climatic factors such as precipitation and prevailing temperatures.

The tribes found in the study areas are Kaonde and Lunda people in Solwezi, North Western Province; Bemba speaking people of Kasama, Northern Province; the Lozis and Mbundas of Mongu; Western Province; the Tonga and Goba speaking people of Siavonga, Southern Province; the Nsenga and Kunda people of Nyimba, Eastern Province and mixed Lenje, Soli, Tonga and other settlers of Chibombo in Central Province. Ethnicity of the local people in the different zones affects the type of foods grown and those obtained from the forests. The eating habits of the different ethnic groups differ markedly. The consumption of certain foods is looked down on by some ethnic groups, either as a sign of being too poor to afford better food or simply because the food is eaten by a rival ethnic group.

Generally, the same range of staples (maize, sorghum, millet and cassava), with some variations in terms of preference and alternatives among ethnic groups, are processed into flour for the making of nshima (a thick porridge eaten with relish). Nshima is the main energy supplier in the Zambian diet. Most ethnic groups consume their nshima mainly with cultivated food legumes and cultivated and wild vegetables. The levels of protein of animal origin are generally low in the diet of most Zambian people. With the exception of the cattle rearing communities of Western province, Southern Province and Central

Province where cattle are a symbol of wealth, and where milk is a part of the diet; and the fishing communities along major rivers such as the Zambezi, the Kafue and on lake shores such as Lake Kariba, Mweru and Tanganyika shores. Mushrooms, wild vegetables and fruits are normally collected by children, where they are available but because of economic gain near urban areas, many women spend long hours gathering mushrooms for market. In farming communities, mushroom gathering tends to compete with weeding period.

The number of meals consumed in a day and foods eaten varies from one ethnic group to another. The Lozi, Mbunda, Kaonde and Lunda ethnic groups consume three meals a day, i.e. breakfast, lunch and supper. The Bemba speaking people usually only have breakfast in the morning and a late afternoon main meal ‘’because the women are too busy during the day to prepare meals’’. For the Bemba there is no difference between foods eaten at different times of the day. Any type of food can be eaten at any time, if available. The Tonga and Goba speaking people of Siavonga may have breakfast, but usually have one main meal in the late afternoon or early evening. Snacks and beverages if available, are consumed at unspecified times during the day or where distinct breakfast and lunch are not taken.

1.0 INTRODUCTION

Food Composition Tables or databases are used by researchers, health care worker, education personnel, community nutritionists, and persons in charge of food service in hotels, restaurants, hospitals, schools, prisons, rehabilitation and drop-in-centers. It is used to assess nutrient content of the diet in relation to daily requirements and improving the dietary and consequently the nutrition status of those consuming them. These experts use the tables for dietary recommendations, diet formulation and decision making for supplementation or fortification. In addition, the food industry uses them for product development and formulation, enrichment and other processes. At the national level, food composition tables are utilized for developing dietary guidelines and establishing national minimum nutrient requirements for various physiological and pathological conditions.

The tables can also be used for advisory purposes by nutritionists to influence policy makers on specific nutritional issues and national policy that affect the nutritional well being of the people. These tables can also be used to assess the nutritional status and needs of a population consuming some locally available foodstuffs. Thus, it is important for Zambia to determine nutrient composition and document the different local foodstuffs that are not in the current food composition tables and fill in the gaps of essential nutrients not included.

In addition, the food composition tables can be used to develop a food composition database for Zambia. It is important for each country to have its own accurate, reliable and up-to-date food composition database that depicts the nutrients in the foodstuffs available and commonly consumed.

1.1 Literature Review

1.1.1 The Nutritional Situation in Zambia

The nutrition situation in Zambia continues to deteriorate due to many reasons. One important reason is the lack of an articulated food and nutrition policy (a draft policy is now under Government review) and financing for nutrition activities (Kasonso, 1997). This has resulted in nonexistent or haphazard food and nutrition programs that have contributed to the current deterioration in the nutrition situation in the country. Another consequence of the lack of nutrition policy is the unavailability of national dietary nutrient guidelines on the required daily allowances (RDA) for different physiological and pathological conditions. In order to develop RDA, there is a need to know the available foodstuffs consumed by Zambians and their composition.

Many studies have shown that the nutritional status of most communities in Zambia has continued to deteriorate, a situation similar to many other countries in Sub-Saharan Africa. In the advent of the Structural Adjustment Program (SAP) and the removal of subsidies on staple foods and agricultural inputs, food prices skyrocketed while food production trends went down. Job opportunities dwindled in all sectors, particularly the public service that used to be the major employer in Zambia. The result has been a continued increase in the deterioration of important child growth indicators. Stunting has increased from 31% overall in 1994 Priority Survey I (PSI, Hunt *et. al.,* 1994) to 48.2% in 1995 PSII (Hambayi *et. al.,* 1995). Both studies reported low food availability and higher stunting rates in rural

areas of Zambia. Thus increased food production and availability to significantly decrease the rates of malnutrition have been recommended (Kaite *et. al.,* 1994). However knowledge of the nutrient composition of these foods is essential for formulating optimal diets.

In 1972, The National Food and Nutrition Commission (NFNC) of Zambia developed and produced the 1ast edition of the Food Composition Tables (a tabulated format showing the proximate nutrient composition of individual foods for use in Zambia NFNC, 1987). These tables give the proximate nutrient content of different foods used in Zambia both commercially and traditionally, using both common and scientific names. In 1987, the Commission revised the tables in the second edition and has not been revised or updated ever since.

1.1.2 Importance of Nutrients

Nutrients in the diet are important in providing substrate for the various physiological functions of the living organism, which include growth, reproduction, and maintenance of physiological activity and productivity. In deficit or absence or excess, physiological processes are impaired and can only be restored by including them as dietary supplements or feed sources.

Infectious diseases such as malaria, respiratory tract infections, diarrhea diseases and intestinal parasites cause nutritional imbalances. A relationship was found between maternal qualitative malnutrition and especially micro nutrient deficiency with intrauterine growth retardation (Venkatachalam *et. al.,* 1962) and pre-term delivery (Bahl *et. al,* 1994). In addition the inadequate intake of dietary energy and specific nutrients contribute to malnutrition (Hautvast, 1993). Malnutrition also contributes to increased morbidity and mortality by increasing the risk of contracting infectious diseases and worsening the severity of an episode (Sazawal *et. al.,* 1998).

Studies in vitamin A, iron and zinc supplementation have demonstrated interactions with disease conditions. Supplementation of zinc to pre-school children was reported to be an effective low-cost strategy to reduce malaria morbidity (Shankar *et. al.,* 1997). The importance of zinc in human metabolism and growth, both in health and disease is well established (Prasad *et. al.,* 1961). Zinc is essential in the maintenance of the structure of biological membranes (Bettger and O'Dell, 1981), DNA and RNA synthesis (Wu and Wu, 1987) and metabolism of essential fatty acids (Clejan *et. al.,* 1982) making it an essential micronutrient in pregnancy. Zinc supplementation has been shown to reduce all general morbidity indicators and malaria parasites due to acute diarrhea, persistent diarrhea, acute respiratory infection and malaria (Sazawal *et. al.,* 1996 and 1998, Shankar and Prasad, 1998). Zinc was also reported to reduce the incidence of lower respiratory infection (Sazawal *et. al.,* 1998) and to significantly improve the linear growth and weight of preschool children (Krebs *et. al,* 1984 and Walravens *et. al.,* 1983).

These studies emphasize the importance of zinc, iron and vitamin A in health and hence the importance of ensuring adequacy in the daily intake. Sikatulu *et.al.* (1997) reported a high prevalence of malaria among underfive children in Monze district of Zambia and malaria increases losses in iron. The assurance or the recommendation for nutrient supplementation can be made based on the dietary content of the known nutrients and the

physiological condition of the relevant population. In addition folic acid has been shown to be important in pregnancy (Baynes *et. al.,* 1986).

Zambia practices universal supplementation of iron and folic acid to pregnant women who attend ante-natal clinics as recommended by the Food and Agriculture Organization of the United Nations (1988) as these nutrients tend to be low in such physiological conditions.

Malnutrition is a common complication of HIV/AIDS and other infectious diseases such as malaria, tuberculosis, respiratory infections, diarrhoea. The food composition tables can be used to promote consumption of indigenous foodstuffs to increase the variety of available foods for effective nutrition interventions in improving immune response against infections, thereby lowering health care costs because of fewer complications of illness.

1.1.3 Policy Relevance

The composition of the diet is important and predicts the nutritional status of communities consuming the diet. The subject of diet is very complex because it depends on many economic, ecological, social and cultural factors and tends to be location and community specific (Food and Agriculture Organization, 1998). The food habits and dietary pattern of a community are often closely related to its ecological zone. The use of some local foodstuffs is limited to communities that recognize them as a food. Thus, a lot of nourishing foodstuffs go to waste in areas where food is scarce simply because people do not recognize them as food. The availability of comprehensive food composition tables would assist technical personnel in developing dietary guidelines for different areas and different segments of the population using foods that are commonly available in the area. In addition, these tables can be used as the basis for promoting the use of local foods that are under-utilized by communities through nutrition action groups. This is especially important in hunger-stricken areas and places where people are not aware of alternative indigenous wild and cultivated foods.

Food composition tables are important in the formulation of national dietary guidelines for various nutritional needs of the population. The Zambia Dietary Guidelines for People Living with HIV/AIDS is a good example of the use of food tables (Zambian HIV/AIDS Nutrition Guidelines, 2004). It is through the tables that foodstuffs high in desirable nutrients such as vitamin A are identified, for example mangos, avocadoes, are included in a dietary regimen.

The food tables also assist in policy implications in the promotion of agricultural production of indigenous food crops that are well adapted to increase food diversity as protection against introduced mono crop failure and improving yields. Other policy measures include promotion of genetic resource research for preservation and continued development of varieties of cultivated indigenous crops and environmental conservation measures to protect wild food plants and animals. Reliance upon such foods is critical, not only in times of drought but also during the “hungry season”, the months preceding exhaustion of harvested domesticated field crops.

1.1.4 Community Relevance

Many indigenous foods have become overlooked and stigmatized such that their use and consumption are considered shameful. Knowledge concerning the uses of indigenous plants, once readily passed down from generation to generation, is no longer being disseminated. Urbanization is also depriving rural areas of the human resource, which is key in the preservation of indigenous knowledge. Zambia is one of the most urbanized countries in Sub-Saharan Africa (CFA International, 2001). Consequently, communities lose the ability to know which plants are edible, which parts can be utilized, and which are poisonous. The food composition tables can be a basis for stimulating interest in the consumption of nutritious indigenous foods and keeping a record of edible foodstuffs.

In many cases mothers are not knowledgeable in techniques for enriching children's foods, particularly cereal porridge, with nutrient rich foods such as groundnuts, beans or ground fish (kapenta). Snack foods are very few or nonexistent in between meals for most poor Zambians. Thus information on the use, preservation and recognizing particular foodstuffs and their seasonal availability in local communities (Steel, 1997) is important. Macwan'gi, (1997) emphasized the importance of information on child feeding in addition to the value of a balanced diet, its preparation and consistency of food availability. The National Council for Scientific Research (NCSR) reported the formulation of protein biscuits containing soya flour in an effort to create nourishing foodstuffs that would reduce malnutrition, particularly in children. They also developed weaning foods containing soya or sugar beans or groundnuts as the major protein sources (Kaputo, 1992).

To formulate household or commercial weaning foods that are nutritionally balanced and cost effective, the knowledge of proximate or crude nutrient composition such as moisture, ash, energy, crude protein, crude fat and fiber is important. The biological availability of the food nutrients such as absorbed macro and micro nutrients (Hayes, *et. al.*, 1995) is also important but this is much harder and more costly to determine. The knowledge of which foods are available to a community and their compositions would assist nutritionists in helping communities in designing nutritious diets and snacks for their households.

1.1.5 Need for Food Nutrient Analysis And Dietary Diversification

In order to reduce malnutrition and meet the recommended daily nutrient requirements, there is a need to consume a variety of foodstuffs that are rich in specific essential nutrients. Most Zambian diets are not diversified and they often use one staple food such as maize meal complimented with a vegetable and on rare occasions, some meat. The Food Health and Nutrition Information Systems (FHANIS), in a vulnerability assessment study of eleven rural districts in 1998, reported very little food diversification (FHANIS, 1998). Thus the knowledge of nutrient content of Zambian foods is imperative in order to make guidelines on recommendations that are specific or universal in regards to nutrients in a variety of foodstuffs.

In addition, nutritionally balanced diets are important in preventing malnutrition and reducing morbidity due to a variety of diseases endemic in Zambia. An alternative to micro

nutrient supplementation would be to consume a variety of food diets rich in these nutrients. Thus the existence of data on food composition would assist in formulating diets that would meet specific nutrient needs under different physiological and pathological conditions and result in the recommendation of efficient utilization of local foodstuffs, thus increasing the community food base. The knowledge of the content of these nutrients in the common Zambian foodstuffs would assist policy makers in making informed decisions on recommending supplementation and nutrition interventions.

The quantities of the micro nutrients such as vitamin A, zinc, folic acid and iron in the common Zambian diet based on local foodstuffs are not known. Zambia is going through an era where illnesses such as malaria, acute diarrhea, persistent diarrhea and acute respiratory infection and HIV/AIDS have become pandemic. As a consequence Zambia has adopted universal vitamin A supplementation for under-five children and fortification of commonly used foodstuffs such as sugar. Vitamin A supplements are given routinely every six months to under-five children and iron and folic acid tablets are given to pregnant mothers at ante-natal clinics. A micro nutrient fortification project is being initiated under National Food and Nutrition Commission (NFNC) and will include vitamin A (retinol), C (Ascorbic Acid), folic acid, iron, calcium and zinc. However these nutrition interventions are costly in the long term. The determination of the composition of these nutrients in local foodstuffs that are not in the current food tables but are used in the Zambian diet can lead to increased availability of food based for fortification and supplementation and hence save on scarce financial resources and appropriate dietary recommendations would be established.

Zambia is endowed with a presence of many species of edible plants and animals as well as their by-products. Food production, availability and varieties in rural areas are seasonal. Many locally available vegetables are grown and gathered primarily in the rainy season. Vegetables such as cassava leaves grow all year round in areas protected from livestock. Green leafy vegetables can be preserved through drying (raw, blanched or cooked) for use in the dry season. These dry vegetables are often prepared with groundnuts or vegetable oils. However, the nutritional composition of most of these vegetables, whether raw, processed or preserved is not known (Young, 1992). Food processing usually is associated with appreciable nutrient losses that include leaching, volatilization and browning reactions in roasted foods.

In summary, all the studies reported above and literature information justifies the determination of the nutrient composition of all known Zambian foodstuffs. It is also important to show the missing information on food composition, and the effects of food processing and cooking methods on the commonly used foods in the Zambian diet. This information would assist in diet formulation and the recommendation in food preservation, combinations that would provide optimal growth and good nutrition to various physiological growth stages of an individual. Food combinations such as pumpkin leaves with groundnuts with or without addition of soda (sodium bi-carbonate) and the effects of these interactions on the nutrient bio-availability in relation to some important micro-nutrients has not been studied. In order to do these biological availability studies there is need to know the basic gross nutrient compositions of all these foodstuffs for comparison and determination of the availability. However, this research does not include the analyses of nutrient bio-availability.

2.0 MAIN OBJECTIVE

To review, evaluate, revise and publish the Zambian food composition tables

2.1 SPECIFIC OBJECTIVES

1. Review, evaluate and update the food composition tables with data that has been generated since the last revised edition (1987).
2. Identify local Zambian foodstuffs from different parts of the country that are not in the food composition tables.
3. Determine the nutrient composition of the identified priority listed foods according to the specified nutrients in the composition tables.
4. Determine the zinc, folic acid and dietary fiber contents of all foodstuffs in the tables.
5. Determine the effects of processing, cooking and food ingredient combinations on the nutrient composition of common foods.
6. Update and publish the food composition tables.

3.0 MATERIALS AND METHODOLOGY

The research was done in four logical steps as proposed in the original proposal. The first phase involved collating existing data from institutions that have been determining the composition of foodstuffs. The second step involved fieldwork to the different ecological zones to identify the foodstuffs that were not in the existing food composition tables. The third stage involved the laboratory analyses of nutrient content of the selected foodstuffs. The final stage was the compilation of the nutrient composition data into electronic form and writing up this research manuscript.

3.1 Collating Existing Data not Reported in the Existing Food Composition Tables

This phase involved reviewing the existing food composition tables for completeness in order to identify gaps and conformity to international food composition table standards. Then new data from institutions that have done food composition analysis was retrieved and reviewed for inclusion into the current tables.

In order to carryout the literature review desk study field assistants were trained on the agreed format for collecting the information. Letters of introduction and request for information were sent to the various relevant institutions. The researchers paired up with field assistants and visited the institutions. Most institutions could not release their manuscripts to the researchers but were allowed to copy or photocopy the data. Some institutions could not allow the researchers to handle their raw data manuscripts, they required to be given time so that their employees could copy the relevant data and hand it over to the researchers.

Some of the targeted institutions did not have the data that fitted into nutrient composition. Thus only the following institutions were visited: University of Zambia (UNZA), Mount Makulu Research Centre, National Council for Scientific Research (NCSR), Food and Drugs Laboratory, Tropical Diseases Research Center (TDRC), National research institutes and laboratories, Bonnita Zambia Ltd and Central Statistical Office (CSO).

The other targeted institutions were not visited as they indicated clearly that they did not have the type of data that fitted into nutrient composition. These were Natural Resources Development College, Evelyn Hone College, Copperbelt Teachers' Training College, Southern Milling Company Ltd., Amanita Zambiana, Zambia Sugar Company Plc. Speciality Foods and Diamondale Farms.

At the end of the institutional data collection, the researchers reviewed the collected data as to validity, completeness and usefulness. A decision was then made as to whether to include the data in the existing food composition tables or reject it.

3.2 Identification of Un-analyzed Zambian Foodstuffs

This phase involved the identification of foodstuffs that were not in the existing food tables from the three agro-ecological zones of Zambia.

3.2.1 Sampling Rationale:

Zambia has three main ecological/rainfall zones that have distinct vegetation differences. Although many foodstuffs are common in many areas, some species of foods are specific to some areas. In addition, some foodstuffs are not known as foods in other areas. Thus identification and collection of samples from the three zones was done to depict annual variability in food and species differences.

3.2.2 Sample sites:

Two districts representing each of the three ecological zones on the Zambian map (appendix 1) were picked by controlled randomization, ensuring wide and representative coverage.

Zone: I Drier areas having less than 800mm rainfall per annum. Siavonga in Southern Province and Nyimba in Eastern Province were selected.

II In the medium rainfall areas having 800-1200 mm, per annum Mongu in Western Province and Chibombo in Central Province were selected.

III In the high rainfall areas having above 1200 mm rainfall, Kasama in Northern Province and Solwezi in North Western Province were selected.

Three (3) communities were picked from each district in a controlled randomization format. The district zone map was used for identifying communities and areas for sample collection, Focus Group Discussion (FGD) and Participatory Learning Activities (PLA) with the help of the Agricultural Offices.

3.3 Foodstuff Identification in the Field

The team of researchers and seven field assistants were trained in participatory rural appraisal (PRA) methodologies for data collection by a rural sociologist. The training was done over four days, the first two days covered theory and the last two days participants went for fieldwork to test the understanding of the training. This also provided the team an opportunity to pre-test the data collecting instruments such as the checklists for focused group discussions and schedules for recording the data. The final day was used to evaluate the pre-test, debriefing and refining the research instruments.

Focused Group Discussions (FGD) tools were used to collect data on local foodstuffs, their availability, the people's copying strategies during lean (or low food) periods, how the foods were processed and prepared for eating, cultural food habits and any taboos.

Participatory Learning Activities (PLA) tools included **Resource Mapping** to establish where the different foods grow and where they were located in the local area; **Seasonality Analysis** to develop food calendars for each zone in order to establish when the foodstuffs are available and how much; **Causal Analysis t**o establish why some foods are eaten and others not in the areas of study and **Ranking t**o establish importance of certain foods and

the preferences in processing and preparations to assist the researchers prioritize which foods to analyze.

When in the field, the researchers paid courtesy calls on the Provincial headquarters, whenever possible. The most useful offices were those of the District Agricultural Coordinator, the Senior Agriculture Officer and the District Health Specialist. These assisted in mapping the district so that representative sampling was made, especially on topology (low lying or highland) of the area, to ensure interviews and samples were collected from diverse communities and sub-ecological areas. They also put the research team in contact with the extension staff who helped the researchers make arrangements to meet communities and in some cases helped in language translation. One researcher supervised the field data collection at all times.

3.4 Field sample collection procedure

The foodstuffs indicated in the food calendar or seasonal food data were checked against the food composition tables. The foodstuffs not in the composition tables were listed and priority foodstuffs were chosen (due to budgetary constraints for laboratory analyses) using the PLA ranking by the communities.

The prioritised samples that were in season were collected after resource mapping and preserved for later analysis. 0ther samples were collected as and when they came in season based on the food calendars. The maturity of fresh samples and all collected were examined at collection time to ensure uniformity in composition. From the field foodstuff identification exercise, short listed samples collected from several areas and same food varieties were pooled and a representative (composite) sample was stored for analyses.

3.5 Laboratory Sampling for Nutrient Analysis:

Analytical instrument calibration and analyses standardization was done according to the AOAC (1998) or specified laboratory manual methods. Same species of samples were pooled, ground using a Cyclotec 1093 sample mill grinder by Foss Tecator, mixed and put in airtight sample containers and refrigerated or stored at room temperature in a weather controlled laboratory. Samples needing further processing were processed according to the analysis schedule and referenced standard methodologies of the AOAC and others. Pooled samples were re-mixed thoroughly before taking sub samples for analysis to avoid sedimentation errors. Three or triplicate samples per food were analyzed to reduce variability and repetition when readings were too far apart.

3.5.1 Laboratory Methods

All foodstuffs prioritized and selected from those identified in the field studies were processed and stored in airtight containers in readiness for analyses. These foodstuffs were then analyzed for the specified nutrient composition given in the food tables. A total of 93 samples were processed and prepared for analyses. These included 55 foodstuffs varieties and 48 cooked and or with groundnuts added.

For laboratory nutrient analyses, the Association Official Analytical Chemists (AOAC, 1998) methods and other specific nutrient analytical reference methods (Nielsen, 1995) in

use were used observing all applicable laboratory quality control measures (e.g. use of reference materials, standards, triplicates, spiked samples).

3.5.2 Laboratory Analyses and Data Processing

The samples were coded according to the UNZA Nutrition laboratory sample system. Trained laboratory technicians under the supervision of the researchers carried out the analyses. Designated notebooks were used for recording the data. Triple sample analysis was done in order to avoid repetitions when results did not tally. The data was entered in the computer for sorting and tabulation and crosschecked using double entry method to avoid entry errors. Calculations were checked to ensure correct computation of nutrient contents.

3.6 Statistical Analysis

The statistical package “Statistical Programme for Social Sciences (SPSS)” was used for standard deviation analysis, which in turn was used to decide whether to re-analyze the sample or not and for inclusion in the research report tables and for scientific publication.

4.0 RESULTS

The results are organized into sections based on the objectives as follows:

i) Secondary Data Collection of analysed Foodstuff composition generated since the last review in 1987;
ii) Identified Foodstuffs not in the existing food composition tables;
iii) Determined Nutrient Composition of Priority Foodstuffs;
iv) Effects of Processing, Cooking and Foodstuff Combinations on Nutrient Composition
v) The Food Calendars, Processing and Utilization methods presented as annexes.

4.1 Secondary Data on Foodstuffs Composition Generated Since the Last Food Composition Tables Review, 1987

The final institutions that were visited for secondary data collection included the University of Zambia, Mount Makulu Research Centre, National Council for Scientific Research, Food and Drugs Laboratory, Tropical Diseases Research Center, National research institutes and laboratories, Bonnita Zambia Ltd and Central Statistical Office.

4.1.1 Results

The most relevant data on food composition was found at National Institute of Industrial and Scientific Research (NISIR) Food and Nutrition Unit and the University of Zambia School of Agricultural Sciences (Animal Science Nutrition Laboratory) but the had gaps. The NISIR data was old as the institution no longer does analytical work. The Animal Science and Food Science and Technology data had gaps and was restricted to proximate analysis of feeds from feed manufacturing industry and a few minerals of interest such as calcium, phosphorous, Sodium and vitamin. In most cases methods of analysis were not highlighted.

4.1.2 Summary Results

This confirmed that no meaningful food composition analysis has been done on new foods other than routine analyses on some food samples used in the food industry e.g. soybean, sunflower or maize. Thus, this data was disqualified for entry into the revised food composition tables.

4.2 Identified Foodstuffs not in the existing Food Composition Tables

The three ecological zones of Zambia were visited and two randomly selected districts per zone included Siavonga and Nyimba in zone I, Mongu and Chibombo in zone II and Mwinilunga and Kasama in zone III. The outputs per region included Food Calendars depicting availability and seasonality (Annex 1), processing and utilization methods of foods (Annex 2), ranked lists of foodstuffs according to preference, importance and availability. Preference was usually influenced by availability that also influences importance of the foodstuff especially in hunger/lean periods any foodstuff becomes important. The lists were also useful in prioritizing samples for analysis. Samples in season

were collected for processing and photographs of samples *in situ* were taken for reference (Annex 2 of the Revised Food Composition tables, 2007)

4.2.1 Lusitu, Siavonga, Southern Province and Nyimba Eastern Province:
Zone I Low Rainfall (800mm or less per annum)

4.2.1.1 Foodstuffs and Availability

Siavonga and Nyimba are part of the rift valley and are dry areas that are prone to drought. The natural vegetation is mostly woody dominated by the Miyombo woodlands and shrubs. The area revealed a large resource of indigenous trees that are used as staple food, relish and as fruit. However, the nutritional adequacy and access is limited due to over commercialization for fruits such as mabuyu, masau and busika that are sold for export to the cities. The Food Calendars showed a wide range of foodstuffs available in different months of the year (Annex 1). Most of the fruits have a short period of availability and deforestation has lead to loss of food resources (many fruit trees and shrubs have been cut down for cropping fields and charcoal). Nearly all trees and shrubs leaves were edible and this was used as copying mechanism in periods of food scarcity in Siavonga. Some tree leaves when ground could be made into porridge and eaten as a whole meal in famine periods. On the other hand in Nyimba there were fewer tree leaves eaten as relish, but they had also a lot of mushrooms from the forests.

These trees also provided feed for the goats that thrive under this hot environment and the goats are also used as food security strategy and resource for accessing other goods and services when sold. Cattle are kept primarily as wealth and drought power and chickens for food and quick sale for cash. In Nyimba the game reserve is quite close, however people mentioned that game meat is only consumed when the chief is selling from his allocated quota. Game meat used to be consumed in the past as a source of protein, but now with game management controls, poaching is a criminal offence.

In Siavonga nzembwe (bulrush millet) is commonly consumed as a staple while in Nyimba Lupoko (finger millet) is used for brewing beer and occasionally nshima.

4.2.1.2 Processing and utilization methods

Processing was almost limited to pestle and mortar, and grinding stone and beer brewing. Hammer mills are also available for maize and sorghum (maila). Bulrush millet (Nzembwe) is exclusively stone ground on a daily basis for the desired fineness and fresh flavour. Some vegetables are also ground and potash and soda are used for flavour and softening, especially the tree leaves.

The staples are made into hard (nshima) or soft porridge. Relishes are eaten with nshima. Leafy relishes are usually ground and salt, soda/potash and/or groundnuts added if available. Very little oil is used due to non-availability, expense and access. Beverages from the cereals staples include sweet beer (chibwantu) and hard liquor or alcoholic beverages including seven days (opaque beer) and locally distilled spirits like kachasu. In Nyimba sweet beer (Thobwa) is brewed using maize, sorghum and millets individually or in combinations. Kachasu is also a common spirit distilled from cereals. Fruits are also

processed into cider (fermented juice) and fresh liquid used for making porridge in both districts.

The main meal was in the evening and nshima was the major source of energy (carbohydrate) using nzembwe (bulrush millet), maila (sorghum), maize and in famine periods mpunga or lusitu grass, wild roots and tubers (cassava and sweet potatoes and chama a poisonous wild tuber used only in famine periods) accompanied with vegetables or meat relish. Breakfast is usually leftovers from the day before if any, and wild fruit. Very few people along the road have tea and bread. Those with more food eat porridge and nshima or samp or chibwantu made from sorghum or millets and maize. Lunch is similar to breakfast or evening meal to those with more food.

During periods of food scarcity, most households reduce number of meals per day and when the situation becomes worse they skip days without food. During periods of scarcity wild fruit and poisonous roots (chama) that normally require extensive boiling and leaching make up the survival strategies. However, we discovered that most of the knowledge on how to use these poisonous wild roots or beans has not been passed on to young generations. This was due to lack of interest by the young as the methods tended to be tedious and demanded ones ability to certify that the processed food was safe. In most cases people did not feel confident that a young person could do a good job at detoxifying poisonous foods because of lack of standardized processing methods.

4.2.1.3 Composite ranking of foodstuffs for Zone I

The following tables give the community ranking of the available foodstuffs in terms of accessability, importance, preference and abundance which most times dictated what was eaten.

Table 1: Prioritization of foodstuff by the community in Siavonga

Staples	Relish	Fruits
1. Maila (sorghum) 2. Nzembwe (bull rush millet) 3. Maize when available 4. Wild yam - sweet and bitter yam (for lean periods prepared by old people)	1. Okra types (wild and domestic) 2. Pumpkin leaves, cow pea and bean leaves 3. Suuna (cat's whiskers) 4. Mooko (tree leaves) 5. Mundioli (tree leaves) 6. Fish 7. Meat: Goat, chicken, beef (at funerals or weddings) 8. Cucumber leaves 9. Chimowa (amaranthus) 10. Deberebe (wild okra) 11. Rape (for those near water) 12. Grasshoppers in rain season (locasts)	1. Masau 2. Mabuyu 3. Busika 4. Ngaye 5. Njiyi 6. Nchenje 7. Nteme 8. Nkunyukunyu 9. Nkolondo

Table 2: Prioritization of foodstuff by the community in Nyimba

Staples	Relish	Fruits
1. Maize 2. Mapila (sorghum) 3. Lupoko (finger millet) 4. Nyamsisi- Yam- sweet yam	1. Khobwe-cow peas 2. Pumpkin leaves, cow pea and bean leaves 3. Suntha (cat's whiskers) 4. Lumya-tindingoma (Okra types; fresh & dry) 5. Zumba-wild tindingoma Okra types (fresh & dry) 6. Fish 7. Meat: Goat, chicken, beef (at funerals or weddings) 8. Bononwe (amaranthus) 9. Sope, katate (wild okra) 10. Rape (for those near water) 11. Inswa (flying termites) 12. Grasshoppers in rain season (locasts) 13. Bowa- mushroom in season	1. Mango 2. Nthochi-Banana 3. Masau 4. Malambe 5. Ngayingai 6. Munjikha 7. Nchenja 8. Masuku 9. Nhkuyu 10. Nkkondokhondo 11. Nthumbulwa

4.2.2 Mongu, Western Province and Chibombo in Central Province: ZONE II (Medium Rainfall 800-1200mm per annum)

4.2.2.1 Foodstuffs and Availability

The Food Calendars generally showed a wide range of foodstuffs available in the two districts during different months of the year in varying quantities.

Access and availability of foodstuffs for consumption by the people of Mongu is greatly influenced by ethnicity. The Lozi ethnic grouping occupy and control access to the floodplain with its potential for cattle production, fishing, wetland/floodplain agriculture (rice and maize), and harvesting of foodstuffs from the natural fauna and flora of the floodplain. The Mbunda in the uplands have more access to forest foodstuffs such as mushrooms and wild fruits. Both the Lozi and Mbunda grow more or less the same vegetables as shown in the food calendar for zone II.

Markets play a vital role in distribution of different types of foodstuffs to those who would normally not have access to them. Marketed produce includes fish, rice and cattle for Lozi people in the plain or those on the edge of the plain with access to this resource. The Mbunda people in the Highland market rice when they have access to dambo areas. Otherwise the main food crops marketed by the highland Mbunda are cassava, paprika,

Livingstone potato, mushrooms and fruits and other forest products. Some of the foods are sold in Mongu town although the main buyers are traders from Lusaka and the Midlands. The most common vegetables marketed by both ethnic groups are sindambi (sour hibiscus), pumpkin leaves, rape and okra. The main buyers for these vegetables are the local town people.

4.2.2.2 Processing and utilization methods

Processing includes dry grains such as those of maize, rice and sorghum are made into flour at hammer mills or using pestle and mortar if the family cannot afford the hammer mill fee. Pestles and mortars are also used to pound vegetables and fruit, such as muzauli (an oil and protein rich tree seed) and mubula (sour baobab fruit powder) for incorporation in a variety of recipes. Bulrush millet is ground using grinding stones. Leaching in water and or fermentation before they are dried and pounded into flour detoxifies cassava roots. Rice is polished using imported communal rice polishing equipment although some people still use mortar and pestle. Calabashes are used for fermentation of milk and beer brews. Simple distillation equipment is used to distil spirits (kachasu) from various types of fermented fruits, roots and cereals.

4.3.2.3 Food Consumption

The people of Mongu usually have three main meals a day i.e. breakfast, lunch and supper except during periods of scarcity. Various recipes are employed to prepare sweet potatoes, cassava, pumpkins and a variety of porridges and beverages made from cereal flour and/or fruit for breakfast. Scones made from rice, sorghum, finger millet and bulrush millet flour may be consumed with tea or fresh or sour milk. The same foods as well as exotic and local fruits may be consumed as snacks, in-between the main meals when available.

For lunch and supper buhobe or nshima prepared from maize meal, sorghum flour, millet flour, rice flour or cassava flour is consumed with some relish, preferably fish or meat cooked with sindambi and sour milk is also used as relish. The flour from the different cereals or cassava may be mixed for cooking nshima. Vegetables and mushrooms are normally added to fish or meat dishes to vary the flavour or thicken the soup (Food processing Annex 2).

Generally the people of Mongu find the use of vegetables and mushrooms as relish to make a rather dull tasting combination with nshima. The vegetables or mushrooms are consumed as the main relish only when fish, meat or sour milk is scarce. But these can be consumed in cooked combinations with fish and meat.

The most preferred fruits by the Lozi are exotic fruits. Apart from local fruits such as Mumbole and Namulomo which are preferred for their good taste, the local fruits that are most preferred by the Lozi people are those that have several uses such as: Mubula which is used for making porridge, scones called manyende, maheu drink and the fruit is eaten in times of hunger. The nuts are added to relish as an alternative to groundnuts. Muzauli is added to relishes as an alternative to groundnuts or as a source of cooking oil and Mukuwa may be made into a drink.

4.2.2.4 Ranking of Foodstuffs by Importance and Availability

The Lozi and Mbunda ethnic groups have different rankings for food preferences as shown in the Table 3. Below:

Table 3: Preference Lists for Lozis and Mbundas

Preference No.	**Staples**	
	Lozi	**Mbunda**
1. 2. 3. 4.	Maize Rice Sorghum Cassava	Cassava Maize Rice
	Foodstuffs Consumed As Relish	
1. 2. 3. 4	Fish Meat Sour Milk All Vegetables	Meat Fish Sour Milk All Vegetables
	Fruits	
1. 2. 3. 4. 5. 6. 7. 8. 9. 10	Mango Orange Pawpaw Guava Pumpkin Mubula Mumbole Muzauli Mukuwa Namulomo	Mango Mubula Mugongo Muhululuhulu

4.2.2.5 Foodstuffs for Chibombo in Central Province

Table 4: preference lists for chibombo

Staple	Relishes	Fruits
Maize Mapila Cassava 1. Mponda-sweet gourd	1. Pumpkin leaves 2. Cow peas leaves 3. Bean leaves 4. Rape 5. Cabbage 6. Cassava leaves 7. Sweet potato leaves 8. Katate 9. Tomato 10. Onion 11. Chicken 12. Nkhanga-tame 13. Chitashi	1. Mango 2. Pawpaw 3. Guava 4. Oranges 5. Lemons 6. Malubeni- Mulberry 7. Amalumwe Watermelon 8. Chibimbi-Cucumber 9. Masumbi 10. Mpundu 11. Nsokolowe 12. Nchenja 13. Nthumbulwa 14. Muchingachinga

4.2.3 Northern Province and Northwestern Province High Rainfall Zone III

4.2.3.1 Kasama, Northern Province Food Availability

Kasama represented the high rainfall zone (above 1200mm per annum). The Food Calendars (Annex 1) depicted different foods available at different times of the year in their fresh or dry form. Most of the foods consumed in households are grown in the fields during the rainy season. Surplus foodstuffs are dried for storage, to be consumed when the rains are over. Vegetables such as the okras germinate in the fields on their own as long as fields are ploughed. The majority of the fruits and some animals are found in the bush. People fetch or hunt for them to bring them home to be used as food. Gardening is common during the dry spell in all the four areas visited. Most vegetables are available through out the year due to prevalence of gardening.

4.2.3.2 Processing and Utilization

The most common method of processing was mortars and pestles pounding grains and legumes to make the required powders e.g. millet flour or groundnut powder. Grinding stones are used to grind millet. Oil expressing machines are used to express oil from sunflower. Hammer mills are used for milling cereal grains such as maize and cassava.

Big drying stones are used for drying cassava chips and some grains. Other small materials such as dishes, sieves, knives, baskets etc, are also used for food processing.

Boiling is the most common method of preparation for vegetables, legumes and mushrooms. Some vegetables such as lubanga (cat's whiskers) require blanching and decanting in order to remove some bitterness. Others like nsululu are cooked for a long time while decanting water to detoxify them. Cooking with soda is a common practice in all communities. Soda is added to a lot of relishes to make them soft e.g, pumpkin leaves, or to change colour (e.g. bungusa-mushroom) and to reduce bitterness or poisonous substances in the food (e.g. cassava leaves).

Frying with oil is rarely used for vegetables and meat due to scarcity of cooking oil. Addition of groundnuts to foods is widely practiced for a number of foods. Dry frying is done for foods such soybean for making soy coffee, pumpkin seeds and groundnuts.

Soaking of cassava tubers is widely practiced in all areas. This is intended to remove the cyanide principles (poison) in the bitter cassava roots. The cassava is soaked for about 3-4 days and then made into chips and dried. Germination of cereals such as millet and maize is practiced by those brew beer or chibwantu (sweet beer).

Most legumes are shelled to reduce on bulkiness and ash is added to them so they can keep longer in storage.

Grain and cassava flour are used to make nshima, munkoyo or beer. The nshima is eaten with vegetables, meat, mushrooms, or legumes as relish. It is normal for several vegetables to be mixed when cooking. There is no difference between the meals eaten as breakfast, lunch and dinner. Nshima and myungu (Pumpkins) are usually eaten in the morning when they are available. Two meals only are commonly eaten during the rainy season when women are busy in the fields.

Boiled or roasted sweet potatoes or fresh cassava; or cooked pumpkins may be eaten as snacks or whole meals. Fruits are also eaten fresh as snacks when available.

Table 5: Kasama Ranking of Foodstuffs by Importance and Availability

Staples	Relish	Others
1. Cassava 2. Maize 3. Millet 4. Sweet potatoes 5. Pumpkins	1. Beans 2. Groundnuts 3. Cassava leaves 4. Mushrooms 5. Caterpillars 6. Okra 7. Sweet potato leaves 8. Bean leaves 9. Cowpeas 10. Cowpea leaves 11. Amankolwe Makangala	1. Soya beans - legume 2. Sunflower - oil seed 3. Mfungo - wild fruit

4.2.3.3 Solwezi, North-Western Province high Rainfall Zone

Solwezi, another area with rainfall above 1200mm per annum, had Food calendars that were similar to those of Kasama. However, the people of Solwezi are socio-economically business people. They sell almost all their produce in order to obtain the desired cash. Storage of produce is not a priority, even at the expense of repurchasing foodstuffs that may have been sold off at a lower price earlier. Household food security is not planned for.

4.2.3.4 Processing and Utilization

The food processing methods were similar to those of Kasama, though in Solwezi grains and cassava chips are more commonly taken to hammer mills for flour making.

Breakfast foods include porridge prepared mainly from maize meal, and irish potatoes (mbatatishi). Lunch and supper foods consist of nshima (bwali or maize meal) and relish. Bwali is prepared from cassava, sorghum, maize or finger millet. Cassava is mainly eaten in the rainy season (December to January) when the other cereals are scarce. Boiled or roasted sweet potatoes or fresh cooked cassava, or pumpkins are eaten as snacks. Fruits are also eaten as snacks when available.

4.2.3.5 Ranking of Foodstuffs by Importance and Availability

The tribal lines of the Kaonde and the Lunda are the majority of the people of Solwezi. The two tribes have fairly distinct staple food and relish preferences as shown in Table 6. The preference orders for the different fruits and insects consumed are in Table 7. The relationship between the Lundas and Kaondes is perpetually confrontational with individuals from each tribe challenging those of the other tribe at the slightest opportunity. Cassava, the main staple food for the Lundas, is considered by Kaondes as food for poor people or for the low class of society. Katolo is one of the most preferred vegetables by the Lunda people. The Kaonde considers it as a vegetable for women. Generally the two tribes appear to keep away from the other tribe's food. The mushrooms are all liked the same by the people.

Table 6: Staple Food and Relish Preference* Lists of the Kaonde and Lunda

Lunda	Kaonde
Staples	
1. Makamba (Cassava) 2. Masangu (Sorghum) 3. Luku (Finger Millet)	1. Mebele (Sorghum) 1. Mataba (Maize) 3. Luku (Finger Millet)
Foodstuffs Used as Relish (Manyi)	
1. Matamba (Cassava leaves) 2. Kalemwila (Kalembula-Kaonde, sweet potato leaves) 3. Mulengi (Lengalenga-Kaonde) 4. Usi-(Katolo-Lunda) 5. Makundi (beans) 6. Kateti (Leaves Look Like Impwa Leaves) 7. Mayumu-Finkubala (Caterpillars) 8. Mwilembu-Mulembwe (hibiscus spp.) 9. Mashenke	1. Musebo (Ndulwe- T) 2. Busepa (Mushroom) 3. Matamba (Cassava Leaves) 4. Landa (Cowpeas) 5. Nkunde (Beans) 6. Bapuku (Rodents) 7. Tetele (Pumpkin seeds) 8. Bwengo (Sesame seeds)

*Ranked in decreasing preference order.

Table 7: Preference* Lists for Fruits and Insects* Lists of the Kaonde and Lunda

Fruits	Insects
1. Tulubi 2. Tupwi 3. Fungo 4. Mabungo 5. Samfwa 6. Mwungu(pumpkin) 7. Mango 8. Makusu (masuku) 9. Machipa or machimba-small pumpkin (mponda)	1. Tunkubi 2. Binkubala (caterpillars) 3. Nyenze (crickets) 4. Baankala (crabs) 5. Shonkonono-grasshoppers 6. Maluko (larvae of bees)

*Ranked in decreasing preference order

4.2.4 Priority List for Analysis

Based on the priority lists of the three different zones a total of 61 foodstuffs were selected for analysis as raw samples. Thirteen (13) vegetables and six (6) mushrooms were selected for blanching in order to determine the effect of short periods of cooking on the nutrient content of these foods, as they are expected to lose some nutrients on cooking. Thirteen vegetables were selected for normal traditional cooking with addition of groundnuts and/or soda. Groundnuts are expected to improve the content of some nutrients such as protein and fat (oil), while the alkaline conditions produced by addition of soda are known to be destructive to some B vitamins and vitamin when added in excess. *C.Yams* (chama) was cooked for a long time while decanting water by an elderly lady in Siangwemu to remove the toxins. Green caterpillars were selected for blanching as they change colour when cooked and it is usual for them to be blanched before drying. Un ripe mangoes were selected for cooking porridge, as this is a common method of preparation in times of food scarcity. Muzauli was selected for cooking as it is normally added to relish when cooking. Below is a table of the complete list of foodstuffs selected for analysis.

Table 8: Foodstuffs Prioritized For Analysis

NO.	Name of Foodstuff	Category	Method of preparation for analysis		
			Raw	Par-boiled	Cooked with Ground nuts and/or Soda
A.	Staples				
	Mupunga grass (Lusitu grass)	Cereals	X		
	Wild yam (chaama)	Roots and	X		X (Cooked for
3.	Makoto yam (aerial yam)	Tubers	X		Detoxification)
B.	Vegetables				
1.	Groundnuts - chalimbana,	Pulses	X		
2.	makulu red	Pulses	X		
	Bean varieties:	Pulses	X		
	kabulangeti,	Pulses	X		
	white,	Pulses	X		
	dark red,	Pulses	X		
	Solwezi	Pulses	X		
	Impwa	Fruit	X		X
	Musebo	Leafy	X		X
	Tindingoma	Leafy	X	X	X
	Sindambi	Leafy	X	X	X
	Chibangankonde	Leafy	X	X	X
	Makowa	Fruit	X	X	X
	Pupwe	Leafy	X	X	X
	Mooko	Leafy	X	X	X
	Chimowa	Leafy	X	X	X
	Deberebe	Leafy	X	X	X
	Chibwabwa (Pumpkin leaves)	Leafy	X	X	X
19	Chimpapila (Bean leaves)	Leafy	X	X	X
20	Katapa (Cassava Leaves)	Leafy	X	X	X
				X	
				X	

Table 8: Continued Prioritized Foodstuffs for Analysis

NO.	Name of Foodstuff	Category	Method of preparation for analysis	
			Raw	Parboiled
C.	Insects			
1.	Caterpillar – big green caterpillars,	Caterpillar	X	
	small stripped caterpillars,	Caterpillar	X	
	thorny caterpillars	Caterpillar	X	
2.	Termites – full fat type	Insects	X	X
D.	Mushrooms			
1.	Busepa	Mushroom	X	X
2.	Bankulumbwe	Mushroom	X	X
3.	Banyime	Mushroom	X	X
4.	Zondwe	Mushroom	X	X
5.	Sichikwele	Mushroom	X	X
6.	Ndyu	Mushroom	X	X
E.	Fruit			
1.	Munjongolo	Wild Fruit	X	
2.	Munyelenyele	Wild Fruit	X	
3.	Muzauli	Wild Fruit	X	X
4.	Ntungulu	Wild Fruit	X	
5.	Masau	Wild Fruit	X	
6.	Busika	Wild Fruit	X	
7.	Ngaye	Wild Fruit	X	
8.	Njiyi	Wild Fruit	X	
9.	Matondo	Wild Fruit	X	
10.	Nteme	Wild Fruit	X	
11.	Manego	Wild Fruit	X	
12.	Mukuwa	Wild Fruit	X	
13.	Mubula	Wild Fruit	X	
14.	Mungongo	Wild Fruit	X	
15.	Masuku	Wild Fruit	X	
16.	Mabungo	Wild Fruit	X	
17.	Tupwi	Wild Fruit	X	
18.	Fungo	Wild Fruit	X	
19.	African Dates	Wild Fruit	X	
20.	Mango	Exotic Fruit	X	X

4.2.5 List of Foods not in Current Food Composition Tables and not to be Analyzed

Foodstuffs identified as not analyzed in both the existing and revised food composition tables are presented by areas where they are consumed. Common and scientific names are also indicated where available.

4.2.5.1 Zone I : Table 9: Siavonga Foodstuffs not Analyzed

STAPLES	FRUITS Muchingachinga Humo Lwiindi Mafufwe Makuli Mankondole
VEGETABLES LOCAL NAME Booboo Bukowa (dry cucumbus) Bwengo Chakaka (cucumber leaves) 5 Fulanondo 6. Matuaselwe 7. Mooko 8. Mundyoli 9. Dereregoba Tsangu 11. Wakwala	Mateme Mbubu Mbwila Mpombolo Nabuya Nchenje Njoongwa Nkunyukunyu Nsangu Sikili Nkolondo

Total number of new Siavonga Foodstuffs not on list for analysis = 28

4.2.5.2 Zone I : Table 10 : Nyimba Foodstuffs not Analyzed

Staples	**Relish**	**Fruits**
Maize Mapila (sorghum) Lupoko (finger millet) when available	Zyama Sope, Katate-wild tindingoma Okra types (fresh & dry) Fish Meat: Goat, chicken, beef Bonongwe (amaranthus) Sope, katate (wild okra) Inswa (flying termites) Grasshoppers in rain season (locasts) Bowa- Some 7 varieties mushroom in	1. Pumpkins Nthochi-Banana Ngayingai Vitunguza Munjikha Nchenja Masuku Nhkuyu Nkkondokhondo Nthumbulwa

	season	

Total number of Foodstuffs from Nyimba, Zone I, not analyzed is 29

4.3.5.3 Zone II: Table 11 : Mongu Foodstuffs not Analyzed

Staples	**Meat Relishes**	**Fish**	**Fruits**
Lindowa Linjefu Mahwahwa Makwangala Mambongo Mampana Maoma Mashela Mumosomoso	Hopani Kashimbandala Kulu Lindondwe Linyunywani Litindi Litokola Lumuna Lipeba Mai akwena Shakame	Lemwe Limbala Lindombe Lipatini Lishiba Lubango Mbufu Mbuma Mushuma Nakatenge Ndombe Ngweshi Njinji Seo Singongi Situhu	Mambongolume Muhamani Mukekete Mulolo Mumbole Mumbulwembulwe Mumbundwe Munbwengelenge Mutoya Mwangalala Namulomo Nswee Makana Manganja Manjuju Mapuwo Milo Mukasa Mulengwe Munganda Mungwinji Nakanjeke Nongolo Sibonyani Simbambwe Simbita
Vegetables Bushele Iliya Kabunga Kankolola Kayubula Lichikwi Lilangasinde Liluwe Limbende Linatwa Mahapu (w.melon Leaves)	**Insects** Sumbi		
	Mushrooms Nakandama Ndwindwi Silutoko Tepe		

Total number of Mongu Foodstuffs not on list for analysis = 78

4.2.5.4 Zone II: Table 12 : Chibombo Foodstuffs not Analyzed

Staple	Relishes	Fruits
1. Mponda-sweet gourd	Katate Tomato Onion Chicken Nkhanga-tame	Malubeni- Mulberry Amalumwe Watermelon Chibimbi- Cucumber Masumbi Mpundu

	Chitashi	Nsokolowe Nchenja Nthumbulwa Muchingachinga

Total Foodstuffs from Chibombo not to be analyzed are 16

4.2.5.5 Zone III : Table 13 : Solwezi Foodstuffs not Analyzed

Vegetables	Meat	**Fruits**
Bitachi Ilunga Mashenke Mulembwe/Kiswita Musabi Musebo (Ndulwe-T, Nkwila- B, Nthuma-N) Patu	**Domestic** Bangalamwe (Pigeons) Kibata (Duck) Makanka (Guinea Fowl) Chipulu Wild Chikololo Impombo (Impala) Insenshe Kachiimba Kafumbe Kala Kamumbuma Kasha Katonto Kibila Kolwe (Monkey) Lukumbi Lumembe Mpongo Musache Nsimba Shibolwe	Bukufuti Insafwa (Amasafwa) Makole Makonkola (amakonko) Mankulwiba Miindo Mikuyu Mukalukufia Musole Nkofwa Nkolobondo Nkulukupya Nkurukufwa Nshimayaruko Nsokolela Nsombojojo Sokobele Makisu Yakisungu
Insects Kalolo Maluko Nkofu Sunsumana Tukooto Tunkubi		
River life Bitonyo Kaaleya Kasepa Kiseense Kitoyo Milombe		**Others** Bwengo (sesame seeds) Kishe Misume Mwandakasuba Nsunza Tolo

Total number of Solwezi Foodstuffs not on list for analysis = 64

4.2.5.6 Zone III : Table 14 : Kasama Foodstuffs not Analyzed

Meat	**Mushrooms**	**Fruits**
Kasanga	Bwalanda	Amalumwe
Inkwale	Chifukula	Chisofu
Nhosololo	Chiteleshi	Utusongole
Nshinge	Nkombo	Matete
Nkate	Pape	Nsongwa
Kote	Ichikolowa	Nsanfwa
Nsengele	Chibengele	Nkhundukubwila
Akapele	Tanda	Nsokolobe
Nsenshi	Samfwe	Nsanye
Ntekute	Lusasa	
Mbata	Impufya	
	Munya	
	Chitooli	
	Kasendapukutu	
	Kolokondwe	

Total number of Kasama Foodstuffs not on list for analysis = 31

4.3 Nutrient Composition of Prioritized Foodstuffs

The Table 15 shows the nutrient composition of the selected foodstuffs that were not in 1987 food composition tables on air-dry basis. The table has been broken further into several tables comparing the nutrients of some important common foodstuffs. These comprise the raw relishes (table 16), relishes boiled with or without groundnuts (table 17) and the wild fruits (table 18).

Table 15: Nutrient Composition of New Foodstuffs

Common Name	Local Name	Scientific Name	Condition	Cooking Method	Moisture	Protein	Oil	Calcium	Ash	ME	G.E. Kcal/g	Vit C	Iron	Zinc
Aerial yams	Makoto yams (L)				6.56	5.97	0.61	1.17	4.22	3.20	3.51	202.84	11.00	2.80
Amankolobwe	Amankolobwe	*Cucubitus*	Dried	Boiled	6.58	10.54	-	1.58	12.43	2.88	3.37	1.93	32.54	8.4
Amankolobwe	Amankolobwe	*Cucubitus*	Dried	with groundnuts	5.2	18.56	28.52	1.32	12.1	4.21	4.87	1.21	22.74	2.01
Amankolobwe	Amankolobwe		Dried	Raw	6.77	22.2	5.32	2.01	19.46	2.86	3.3	3.56	86.38	2.58
Avocado seeds	Avocado seeds	*Persea americana*	Dried	Raw	6.26	5.39	3.06	0.96	2.73	3.38	4.06	0.97	3.69	0.73
Bean Dark Red	Chilemba (B)	*Phaseolus vulgaris*	Dried	Raw	8.97	21.87	1.55	0.72	4.24	3.16	4.77	76.75	0.35	0.01
Bean leaves	Chimpapila (B), Sampu (K)	*Phaseolus vulgaris*	Dried	Raw	5.27	27.66	3.53	2.6	12.29	3.09	4.36	549.35	0.12	0.03
Bean leaves	Chimpapila (B)	*Phaseolus vulgaris*	Fresh	Boiled	3.28	67.27	3.92	3.38	12.46	3.17	4.32	161.23	59.15	0.37
Bean leaves	Chimpapila (B)	*Phaseolus vulgaris*	Fresh	with groundnuts	2.03	25.05	35.4	1.55	7.56	4.79	6.25	123.34	11.44	1.73
Beans	Kabulangeti beans	*Phaseolus vulgaris*			8.89	18.8	1.4	0.4	4.42	3.15	4.06	109.02	0.05	0.02
Beans	White beans	*Phaseolus vulgaris*			9.69	17.06	1.55	0.5	4.63	3.12	4.25	161.54	0.08	0.03
Black jack	Kanunka (B)	*Bidens pilosa*			6.72	30.01	3.25	2.08	8.46	3.16	3.63	193.2	76.20	0.97
Black jack	Kanunka (B)	*Bidens pilosa*	Dried	with groundnuts	2.33	29.09	37.13	1.23	5.58	4.93	6.2	34	12.89	2.46
Black jack	Kanunka (B)	*Bidens pilosa*	Dried	with groundnuts	5.38	28.94	3.19	2.39	11.35	3.11	3.33	1.45	45.8	4.75
Black nightshade	Ndulwe, Nkwila (B), Musebo (K), Nthuma (N), Ndulwe (T),	*Solanum nigram*	Dried	Boiled	4.09	22.74	3.55	2.12	15.29	3.03	4.46	868.19	0.79	0.06
Busala	Busala	*Dioscorea hirtiflora*	Fresh	Raw	6.5	8.63	0.46	0.83	4.62	3.18	3.58	1.23	18.43	0.87
Busala	Busala	*Dioscorea hirtiflora*	Fresh	Dried	7.99	6.52	0.62	0.86	13.12	2.84	3.19	1.23	15.08	0.8
Busala	Busala	*Dioscorea hirtiflora*	Fresh	with groundnuts	6.95	16.34	23.89	0.9	7.94	4.09	4.67	1.12	9.09	2.94
Cabbage	Cabbage	*Brassica oleracea var. capitata*	Fresh	Boiled	5.69	29.09	1.57	1.45	6.82	3.18	3.87	193.89	3.80	0.24
Cabbage	Cabbage	*Brassica oleracea var. capitata*	Fresh	with groundnuts	2.89	27.84	34.82	1.03	6.48	4.78	5.8	4.03	4.25	1.56
Cassava leaves	Katapa (B), Matamba (K), Shombo (L)	*Manihot esculenta*			3.93	34.99	7.16	1.4	7.34	3.48	4.84	1219.72	0.24	0.06
Cassava leaves	Katapa (B), Matamba (K), Shombo (L)	*Manihot esculenta*	Fresh	Boiled	4.64	31.69	8.06	2.61	6.3	3.53	4.87	1.61	24	3.19

Common Name	Local Name	Scientific Name	Condition	Cooking Method	Moisture	Protein	Oil	Calcium	Ash	ME	G.E. Kcal/g	Vit C	Iron	Zinc
Cassava leaves	Katapa (B), Matamba (K), Shombo (L)	*Manihot esculenta*	Fresh	with groundnuts	-	24.06	34.79	-	8.88	4.79	5.62	310	7.98	3.35
Caterpillars	Finkubala (B)		Dried	Raw	6.46	56.7	12.12	1.57	7.03	3.62	5.06	0	75.12	1.62
Caterpillars	Finkubala (B)		Dried	Boiled	4.06	55.04	14.26	1.02	5.8	3.84	5.3		25.76	1.18
Caterpillars	Ifishimu (B) Tunkubi (K)		Dried	Boiled	4.6	49.17	22.53	0.56	3.62	4.27	5.74	2.10	-	-
Caterpillars	Masese (B)		Dried	Boiled	7.18	47.9	17.85	0.83	3.8	3.96	5.48	76.75	0.06	0.07
Caterpillars	Finkubala (B)		Dried	Boiled	4.31	37.04	29.75	1	5.75	4.53	5.85		11.38	6.22
Caterpillars green	Ifishimu (B) Hikubala (T)		Dried	Boiled	4.45	57.46	21.71	0.52	3.55	4.24	5.82	-	-	-
Caterpillars green	Ifishimu (B) Hikubala (T)		Dried	Boiled	4.21	58.76	21.07	0.44	3.64	4.22	6.05	-	-	-
Catswhiskers	Lubanga (B), Suntha (N), Shungwa (T)	*Cleome gynadra*	Fresh	with groundnuts	2.17	34.36	41.37	-	6.77	5.08	6.34	1.61	13.98	3.69
Catswhiskers	Lubanga (B), Suntha (N), Shungwa (T)	*Cleome gynadra*	Fresh	Boiled	4.12	26.25	2.82	2.55	13.16	3.07	4.28	193.8	31.90	0.72
Cocoa yam	Cocoa yam	*Dioscorea spp.*		Raw	7.63		1.58	2.22	2.64	3.26	3.84	1.21	1.95	0.96
Cow pea leaves	Kachesha (B)	*Vigna unguiculata*	Fresh	Boiled	2.43	27.48	3.25	2.53	23.81	2.77	3.96	209.82	71.08	0.54
Cowpea leaves	Kachesha (B)	*Vigna unguiculata*	Fresh	with groundnuts	2.83	26.82	30.5	1.71	8.91	4.50	5.65	1.45	23.95	0.43
Cowpea leaves	Kachesha (B)	*Vigna unguiculata*	Dried	with groundnuts	2.08	45.03	40.07	1.8	7.08	5.02	6.15	-	7.6	1.93
Dried sour rosella	Dried sindambi boiled	*Hibiscus meeusei*	Dried	Fresh	5.32	27.27		1.94	6.25	3.15	4.1	80.7	29.27	0.41
Fruit	Ngai (T)		Dried	Dried	3.54	3.94	0.51	1.32	6.17	3.24	4.62	302.94	0.64	0.04
Garden eggs	Impwa (B)	*Solanum macrocarpon*	Fresh	Fresh	8.34	12.25	2.82	0.55	6.03	3.17	3.98	145.42	0.07	0.04
Garden eggs	Impwa	*Solanum macrocarpon*	Fresh	with groundnuts	5.32	20.3	28.95	1.29	6.09	4.44	6.69	161.55	2.75	0.79
Garden eggs	Impwa	*Solanum macrocarpon*	Fresh	Boiled		13.05	4.78	2.04	5.19	3.59	3.96	2.42	4.7	1.91
Green gram		*Phaseolus aureus*	Dried		7.01	24.5	0.77	1.45	4.26	3.19	3.37	38.63	12.05	0.55
Groundnuts chalimbana	Mbalala (B), Nshaba (N), Ndongo (L)	*Arachis hypogaea*	Dried		5.99	27.1	39.65	1.13	2.56	5.02	6.45	-	4.39	2.46
Kasona yam	Kasona yam	*Dioscorea spp.*	Dried	Raw	8.65	5.23		1.59	4.19	3.10	3.65	2.42	1.8	1.14

Common Name	Local Name	Scientific Name	Condition	Cooking Method	Moisture	Protein	Oil	Calcium	Ash	ME	G.E. Kcal/g	Vit C	Iron	Zinc
Lumanda	Lumanda	*Hibiscus meeusei*	Fresh	with groundnuts	3.21	21.71	37.4	1.19	10.57	4.73	5.86	0.97	5.75	2.08
Lusitu Rice	Mupunga		Dried		5.13			1.15	4.71	3.21	3.97	106.25	22.00	0.60
Makowa	Makowa		Dried	with groundnuts	4.54	20.23	24.81	0.85	9.46	4.17	4.82	45.23	8.04	2.67
Makulu red (groundnuts)	Mbalala (B), Nshaba (N), Ndongo (L)	*Arachis hypogaea*	Dried		4.12	25.2	48.11	1.06	2.32	5.47	7.92	57.95	11.10	0.46
Mango	Mango	*Mangifera indica*		Boiled	9.27	2.09	0.76	0.81	2.02	3.19	3.59	42	2.34	0
Mango	Mango	*Mangifera indica*	Fresh	Raw	11.23	5	-	1.79	1.79	3.10	3.49	54	2.35	0.98
Masau	Masau	*Ziziphus mauritania*	Dried		1.26	6.78	1.46	1.23	4.98	3.40	3.35	289.77	16.15	0.07
Moringa	Moringa		Dried	Raw	6.73	37.49	5.22	2.22	9.67	3.21	3.66	3.4	13.72	1.45
Moringa	Moringa		Dried	Boiled	7.87	37.05	5.86	1.89	7.82	3.26	3.73	5.32	12.98	1.65
Mubula	Mubula (B) Mbula (T)	*Parinari curatelifolia*	Dried		3.2	6.7	1.19	1.35	2.99	3.39	4.01	154.54	12.70	0.02
Mungongo nut	Mungongo		Dried		5.34	23.54	57.38	1.27	4.23	5.77	7.04	48.29	13.7	0.09
Mushroom	Banyime (K)	*Lactarius spp (Russulaceae)*	Dried		10.98	30.39	4.6	0.99	11.01	2.98	4.5	125.23	1.35	0.02
Mushroom	Sichikwele (L)	*Lactarius spp (Russulaceae)*	Dried		5.57	24.6	5.48	1.48	13.03	3.14	4.63	137.32	0.27	0.01
Mushroom	Zondwe (L)		Dried		4.9	21.43	3.67	0.28	9.11	3.22	4.86	214.03	0.67	0.02
Mushroom from wood	Busepa (K), Pampa (B)	*Schizophyllum commune*	Dried		11.53	13.78	2.07	0.75	4.61	3.08	3.7	84.83	0.71	0.06
Mushroom from wood	Busepa (K), Pampa (B)	*Schizophyllum commune*	Dried	Boiled	6.18	10.3	1.8	0.88	9.71	2.99	3.43	2	7.89	4.16
Mushroom from wood	Busepa (K), Pampa (B)	*Schizophyllum commune*	Dried	with groundnuts	5.18	18.9	12.1	1.2	8.13	3.09	3.55	2	5.78	3.45
Muzauli	Muzauli		Dried		5.72	12.09	35.07	1.29	1.51	4.86	6.25	48.29	13.70	0.09
Njamva yam	Njamva yam	*Dioscorea spp.*	Dried	Raw	8.73	9.79		1.89	4.57	3.09	3.62	1.69	3.84	1.65
Okra	Mulembwe (B), Delele (N)	*Hibiscus esculentus*	Dried	with groundnuts	3.48	22.87	31.45	1.38	12.71	4.38	4.84	1.45	9.25	0.44
Okra	Mulembwe (B), Delele (N)	*Hibiscus esculentus*	Fresh	Boiled with soda	4.9	19.09	1.74	1.4	23.14	2.81	3.13	-	14.99	3.89
Okra (ladies fingers)	Mulembwe (B), Delele (N)	*Hibiscus esculentus*	Dried	with groundnuts	5.12	15.37	1.2	1.3	25.62	2.47	5.62	47	3.65	10.69
Pumpkin leaves	Chibwabwa (B) Muchile (T)	*Cucumeropsis edulis*	Fresh		7.91	23.36	2.46	3.79	17.96	2.75	3.7	241.47	44.05	0.59
Pumpkin leaves	Chibwabwa (B)	*Cucumeropsis edulis*	Dried	with groundnuts	1.89	26.9	32.21	1.66	8.61	4.62	6.09	96.94	15.55	0.46

Common Name	Local Name	Scientific Name	Condition	Cooking Method	Moisture	Protein	Oil	Calcium	Ash	ME	G.E. Kcal/g	Vit C	Iron	Zinc
Pumpkin leaves	Chibwabwa (B) Muchile (T)	*Cucumeropsis edulis*	Fresh	Boiled	6.26	20.19	2.94	2.86	13.58	2.98	4.18	64.51	35.01	0.76
Pumpkin leaves	Chibwabwa (B) Muchile (T)	*Cucumeropsis edulis*	Fresh	with groundnuts	2.37	26.34	39.89	3.2	8.27	4.96	6.05	80	7.84	3.25
Pupwe	Pupwe (B)	*Zanthoxylum chalybeum*	Fresh		7.88	11.37	2.1	1.19	8.28	3.08	4.59	533.18	0.08	0.00
Pupwe	Pupwe	*Zanthoxylum chalybeum*	Dried	Boiled with soda	6.9	11.2	2.86	2.93	18.41	3.03	3.42	145.41	31.95	0.29
Rape	Mupilu	*Brassica carinata*	Fresh	Boiled	5.06	26.53	3.89	2.38	13.51	3.07	4.32	193.76	21.68	0.52
Rape	Mupilu	*Brassica napus*	Fresh	with groundnuts	2.91	29.14	32.95	3.2	11.22	4.52	5.75	1.93	6.44	1.52
Rape	Mupilu	*Brassica carinata*	Fresh	with groundnuts	2.42	28.86	37.3	1.27	9.85	4.78	5.59	1.13	5.15	1.78
Rape	Mupilu	*Brassica napus*	Fresh	Boiled	4.48	24.54	3.86	3	25.02	2.68	3.8	2.42	15.3	0.9
Red rosella	Sindambi fruit	*Hibiscus meeusei*	Dried	7.34	7.34	4.35	3.17	2.27	7.18	3.18	3.26	241.46	5.55	3.02
Red rosella	Lumanda	*Hibiscus meeusei*	Fresh	Boiled	5.5	54.01	5.57	2.14	8.03	3.33	4.31	113.06	82.46	0.04
Rosella	Sindambi (L)	*Hibiscus meeusei*	Fresh		6.32	19.68	3.49	2.04	8.17	3.20	4.06	250.44	0.37	0.06
Sesame Seeds	Bwengo (K) Sesame seed	*Ceratotheca sesamoides*	Dried		2.47	17.48	42.18	1.18	12.87	4.89	5.97	-	-	-
Sesamum leaves	Mulembwe utali (B), Lunembwe (L), Katate (N), Bwengo (K, T)	*Ceratotheca sesamoides*	Fresh		5.61	24.8	2.13	2.99	11.5	3.05	3.91	280.1	78.75	0.54
Sindambi	Sindambi	*Hibiscus meeusei*	Dried	with groundnuts	2.69	21.29	34.47	1.25	9.09	4.67	5.59	4.59	13.69	2.24
Solwezi beans	Solwezi beans	*Phaseolus vulgaris*			10.93	19.9	1.57	1.83	4.15	3.09	4.07	105.02	0.06	0.06
Sweet potato leaves	Kalembula	*Ipomoea batatas*	Fresh	Boiled	4.89	21.14	4.34	3.31	13.41	3.10	4.12	161.42	78.47	0.39
Sweet potato leaves	Kalembula	*Ipomoea batatas*	Fresh	with groundnuts	2.37	26.22	34.71	1.59	10.55	4.64	5.58	1.93	15	1.48
Termite Mushroom	Tunkulumbwe (K)	*Termitomyces spp*	Dried		9.7	30.59	2.78	0.72	8.95	3.02	4.39	169.60	0.06	0.04
West african yam	West african yam	*Dioscorea spp.*	Fresh	Raw	10.37	3.66		1.49	4.3	3.04	3.58	0.69	1.85	1.53
Wild bitter Yam	Cooked chaama		Dried		5.45	2.5	1.26	1.09	2.11	3.35	3.29	77.27	12.25	0.03
Wild delele	Lusakasaka (B), tindingoma (N)	*Corchorus tridens*	Dried	with groundnuts	2.92	23.01	34.38	1.17	8.44	4.69	5.73	193.88	14.94	0.42
Wild delele	Zumba		Dried	with groundnuts	4.25	27.68	32.89	1.02	12.44	4.43	5.91	-	4.2	2
Zondwe	Zondwe		Fresh	Boiled	7.68	18.98	3.2	0.84	5.96	3.22	3.67	-	9.15	2.98

Common Name	Local Name	Scientific Name	Condition	Cooking Method	Moisture	Protein	Oil	Calcium	Ash	ME	G.E. Kcal/g	Vit C	Iron	Zinc
Zondwe	Zondwe		Dried	with groundnuts	5.58	18.11	24.1	0.87	6.85	4.19	4.81	-	5.54	2.84
Zumba	Zumba		Dried		5.37	24.69	3.23	1.55	5.57	3.31	4.74	231.82	49.70	0.42

- Insignificant or no result available

The nutrient composition of the relishes varied between variety (e.g. among leafy vegetables) and species (leguminous, ordinary none leguminous, common relish weeds and those of animal origin).

The green leafy vegetables varied in protein content that was much higher than the some of the beans and similar to or higher than groundnuts (table 16). The cereals, tubers and roots had lower protein levels in that order (table 15). Cassava leaves had the highest crude protein content followed by the weed black jack and bean leaves. The different caterpillars had different crude protein levels but all were higher (35-58.6%CP) than the vegetables (21-35%CP) and beans (18-24.5%CP). The mushrooms also showed appreciable crude protein content (18-30.6%CP).

The caterpillars showed higher crude oil content (7.6-24.5% EE) and Gross Energy (4.8-6.1 kcal/g) but were less than groundnuts (39.7 EE and 6.5 Kcal/g) respectively.

Table 16: Nutrient Content of some common selected Relishes

Name	CP %	Oil %	GE Kcal/g	Vit C mg	Iron mg
Bean leaves	27.7	3.5	4.4	549	.12
Cassava leaves	35	7.2	4.8	1220	.24
Pumpkin leaves	25	3.2	4.7	241.5	44.1
Sweet Potato leaves	21.1	4.3	4.1	161.4	78.5
Black jack	30.01	3.3	3.6	193.2	76.2
Caterpillars	35-58.6	7.6-22.5	4.8-6.1	76.8	0.06
Mushroom	13.8-30.6	2.6-5.4	3.7-4.9	125	1.4
Beans (seed)	18-24.5	1.5-3.5	4-4.1	161	0.08
Groundnuts	27	39.7	6.5	-	4.4

Cassava leaves showed very high levels of apparent vitamin C (ascorbic acid) than all the other foodstuffs. Some vegetables such as pumpkin, sweet potatoes leaves and black jack leaves contained high apparent iron.

Boiling tended to reduce crude protein, crude oil, Gross Energy and vitamin C but showed an increase in apparent iron levels in selected common vegetables (Table 17). The addition of ground nuts with or without sodium bicarbonate reduce vitamin C to trace levels that were not detectable.

Adding Ground nuts increased the protein (from 18 % in boiled – 32% CP) and oil (from 3.2-7.1 to 32-40.1% EE content and Gross Energy as consequence of increased oil.

Table 17: Selected Nutrient content of some common vegetables boiled, fresh or dried, with or without groundnuts

Vegetable	Treatment	CP	Oil	GE	Vit C	Iron
Pumpkin	Raw	25	3.2	4.7	241.5	44.1
	Boiled	20	2.94	4.2	64.5	35
	Dried Boiled Groundnuts	26.9	32.2	6.1	97	16
	Fresh Boiled Groundnuts	26.3	40	6.1	-*	8
Cassava leaves	Raw	35	7.2	4.8	1220	.24
	Fresh Boiled	24.1	8.1	4.9	-	24
	Fresh Boiled Groundnuts	31.7	35	-	-	8
Bean leaves	Raw	27.7	3.5	4.4	549	.12
	Fresh Boiled	27.3	4	4.3	161	59
	Dried Boiled & Groundnuts	45	40.1	6.2	-	7.6
Lumanda	Fresh Boiled	**18.4**	5.6	4.3	113	82
	Fresh Boiled & Groundnuts	21.7	37.4	5.9	-	5.8
S/ potato leaves	Fresh Boiled	21.1	4.3	4.1	161.4	78.5
	Fresh Boiled & Groundnuts	26.2	34.7	-	-	15

*Trace

Table 18: Selected Nutrient content of Some Common Fruits

Fruit	Nutrient Content				
	CP (%)	Oil (%)	GE(Kcal/g)	Vit C (mg)	Iron (mg)
Ngai	3.9	0.51	4.6	303	0.64
Mungongo	23.5	57.4	7.0	49.3	13.7
Masau	6.8	1.5	3.4	290	16.2
Muzauli	12.1	35.1	6.3	48.3	13.7
Mubula	6.7	1.2	4.0	154.5	12.7
Mango	2.1	0.8	2.02	-	2.3

The fruits analysed showed variability in nutrient composition. The Mungongo fruit (Table 18) had high protein and oil content at 23.5% and 57.4%^crude protein, respectively and followed by Muzauli (12.1% CP and 35.1% oil, respectively). Both fruit trees were from Western Province and are used extensively as condiments in various dishes. Muzauli

was used to give yellowish colour, aroma and oil to the sweet potatoes and relishes. Ngai and Masau, which are both sweet and sour fruits, had high quantities of vitamin C, 303mg and 290mg, respectively. Except for Mango and Ngai fruits that had low iron content, the rest had comparatively higher iron content.

5.0 DISCUSSION

5.1 The Food Availability and Food Habits of the People in the Sampled Three Ecological Zones of Zambia

5.1.1 The Food Availability and Seasonality

5.1.1.1 The Food Calendars

The food calendars depict foodstuffs that are consumed within an area, the availability and the spread over the year and the quantities available. The results are presented in categories of staples, relishes and fruits from the different ecological zones and the composition. The lean periods of food scarcity across regions are also shown by low or absence of the commodity during a particular month or period. In general the food calendars show a wide variety and diversity of local foodstuffs in the different zones. They also showed varying availability during different times of the year as shown in annex 1. In general the high rain fall areas showed larger quantities of foodstuffs, particularly vegetables. The driers areas showed fruit trees and fruit tree leaves as relishes.

5.1.1.2 The Staple Foods

These are the foods that make up the bulk of the foodstuffs providing the larger proportion of energy requirements of the individual. The main staple foods in all regions included maize, cassava, sorghum, sweet potatoes and millets. Maize was the most common energy staple consumed in all regions. In general the high rainfall zones were areas of food abundance and maize was not the most predominant.

In Solwezi (Zone III) cassava and sweet potatoes were major staple complimented with sorghum, millets and maize between June and September while Kasama in the same Zone had cassava and followed by maize. In areas where due to low rainfall such as Siavonga sorghum and millets were still produced as main grains to cushion the community against maize failure when there is a drought. But even within a low rainfall area such as Siavonga where the zone I is divided into three subzones (valley low lands, middle and high lands), sorghum and millets ranked as most important. They produced more sorghum and millets which provided food for longer periods from March to September as months of abundance and there after reduces and by December to low availability. January to February most households did not have the staple food in the drier areas. These are the lean months when people depend on forestry resources (mushrooms, fruits) and fresh vegetables which were abundant between December and March.

The medium rain fall zone II (800 – 1200 mm) varied in staple food sources. Mongu in Western Province had normal availability of cassava complimented by rice which was abundant between March and October, while maize was available between December and May. The December to February maize was grown on the wetland plains during August to December.

On the other hand Chibombo, in Zone II were predominantly maize producing and consuming area. In these areas the traditional sorghum and millets production and consumption have diminished greatly and mostly used for brewing opaque and sweet beer.

5.1.1.3 Relishes

The relishes have been categorized into leafy and fruity vegetables, forestry resources, animal products and insects. The food calendars (annex 1) show wide variability and diversity between months of the year and by ecological zone. The food composition analysis also shows a wide range of nutrient contents in the different relishes.

The leafy vegetable varied both in diversity and abundance with season and by region. The most abundant season of availability was during the rain season December to March. By May most local rain fed fresh vegetables, most of which grow as weeds in fields, diminish. From May to October rain fed vegetables come from preserved dry sources.

The high rainfall areas showed a wide diversity and availability of leafy vegetables. These varied from leguminous sources, weeds, shrubs and tree leaves. The drier areas of zone I more tree leaves were consumed as vegetables (Siavonga) these also varied between seasons. In the rain season more weed and cultivated types (weed local okras and cultivated okra) were consumed. In the dry season forest shrubs, and leaves and sprouting field weeds, cassava and sweet potato leaves were used as vegetables. High consumption of vegetables was between December and March. Vegetables provided a major copying strategy during lean food periods of December to February when some families sometimes subsisted on vegetables only. The fruity vegetables included egg plants (impwa) tomatoes, pumpkins, gourds and chilis.

Forestry relish resources included mushrooms, insects and caterpillars and game. Most communities near game parks did not list game meat part of their food resources as anti-poaching campaigns were seriously arresting people and in most cases they suspected the researchers would report them to the game authorities.

Mushrooms were the most common forest relish particularly in the heavy rainfall areas of North Western (Solwezi) and Northern (sampled Kasama) indicated a large variety of mushrooms. The drier areas of Siavonga and Nyimba mushrooms were more abundant in the highlands that had forests and enjoyed more rain than the lowlands. The varieties of mushrooms varied from the large umbrella types to colourful delicate small types. The mushrooms were available from December to April depending on the variety of the mushroom. The large umbrella type came out just at the onset of the rain season for a brief period. The tente and the colourful smaller mushroom varied in appearance from place to place and for longer periods.

The leguminous relishes included bean seeds and their leaves. The high rainfall zone III presented a wide diversity and larger availability of beans. These in most areas were reserved for retail and very little consumed. Even when consumed, the quantities consumed were very small.

Insects and caterpillars were also forestry resources. Insects such as termites were also found near homesteads and grasshoppers mostly sub-sisted in fields and sometimes destroyed crops (locust). Caterpillars varied from the types that grow in trees live on leaves (the green types) and those that grow in the grass (of assorted colour). Insect and

Caterpillars had very short seasons in which they were abundant and available and were very localized to specific areas.

Both small livestock (goats, sheep, poultry, doves, rabbits) were common in varying amounts. The chicken was most prominent animal food for most households had a few chickens and could kill and consume frequently. While animals such as goats and sheep were valued as food reserves for barter with cereals or for sale to access cash for purchasing food and other goods and services. Goats were most abundant in the drier zone I areas where edible shrub leaves and pods were abundant. In addition, goats do better in drier climates and tend to catch a lot of diseases in wet areas or seasons. Large livestock such as cattle were rarely slaughtered for food except during funerals, weddings or when they died of other causes. These animals were kept for prestige, as banks on hooves, for traction and draft power and to a large extent as a sign of wealth. In every community people who owned cattle were defined as wealthy because they had cattle they could access cash, had larger fields due to draft power and could afford many amenities.

5.1.2 Influence of Ethnicity and Cultural Food Habits on Nutrition of People in Zambia

Zambia's contemporary culture is a blend of values, norms, material and spiritual traditions of more than 70 ethnically diverse people. There are seven main tribes and languages blending together the 70 dialects. These are Lozi, Bemba, Ngoni, Tonga, Lunda, Luvale and Kaonde. The employment opportunities in mining and associated industries have caused Zambia to be one of the most urbanized countries in Africa (54% people leave in urban areas). About one-fifth of the 10 million national population lives on the Copperbelt and an estimated over 2 million people live in Lusaka, the capital. During the colonial period, the process of industrialization and urbanization saw ethnically different people brought together by economic interests. This, as well as the very definite influence of western standards, has generated a new culture. Many of the rural inhabitants however, have retained their indigenous and traditional customs and values. Rural lifestyles are highly dictated by the surrounding natural resources which depend on climatic factors such as precipitation and prevailing temperatures.

The tribes found in the study areas are Kaonde and Lunda people in Solwezi, North Western Province; Bemba speaking people of Kasama, Northern Province; the Lozis and Mbundas of Mongu; Western Province; the Tonga and Goba speaking people of Siavonga, Southern Province; the Nsenga and Kunda people of Nyimba, Eastern Province and mixed Lenje, Soli, Tonga and other settlers of Chibombo in Central Province. Ethnicity of the local people in the different zones affects the type of foods grown and those obtained from the forests. The eating habits of the different ethnic groups differ markedly. The consumption of certain foods is looked down on by some ethnic groups, either as a sign of being too poor to afford better food or simply because the food is eaten by a rival ethnic group.

Generally, the same range of staples (maize, sorghum, millet and cassava), with some variations in terms of preference and alternatives among ethnic groups, are processed into flour for the making of nshima (a thick porridge eaten with relish). Nshima is the main energy supplier in the Zambian diet. Most ethnic groups consume their nshima mainly with cultivated food legumes and cultivated and wild vegetables. The levels of protein of animal origin are generally low in the diet of most Zambian people. With the exception of the cattle rearing communities of Western province, Southern Province and Central Province where cattle are a symbol of wealth, and where milk is a part of the diet; and the fishing communities along major rivers such as the Zambezi, the Kafue and on lake shores such as Lake Kariba, Mweru and Tanganyika shores. Mushrooms, wild vegetables and fruits are normally collected by children, where they are available but because of economic gain near urban areas, many women spend long hours gathering mushrooms for market. In farming communities, mushroom gathering tends to compete with weeding period.

The number of meals consumed in a day and foods eaten varies from one ethnic group to another. The Lozi, Mbunda, Kaonde and Lunda ethnic groups consume three meals a day, i.e. breakfast, lunch and supper. The Bemba speaking people usually only have breakfast in the morning and a late afternoon main meal ‘’because the women are too busy during the day to prepare meals’’. For the Bemba there is no difference between foods eaten at different times of the day. Any type of food can be eaten at any time, if available. The

Tonga and Goba speaking people of Siavonga may have breakfast, but usually have one main meal in the late afternoon or early evening. Snacks and beverages if available, are consumed at unspecified times during the day or where distinct breakfast and lunch are not taken.

5.1.2.1 Breakfast Foods

For the Tonga and Goba people of Siavonga breakfast is usually leftovers from the day before if any, and wild fruit. Those with more food eat porridge and nshima or samp. The Bemba speaking people of Kasama also normally have nshima leftovers from the previous day, while some households can afford to make porridge from flour made from staples. In the rainy season pumpkins or gourds may be consumed. The Kaondes and Lundas of Solwezi breakfast foods include porridge prepared mainly from some mealie-meal, and irish and sweet potatoes, when available. The main nutrient obtained from breakfast foods is usually energy or minerals and vitamins where fruit is consumed.

The Lozis and Mbundas of Mongu process flour from sorghum, finger millet, bulrush millet, and rice into scones or porridge which are consumed with tea, fresh or sour milk, or maheu for breakfast. Sweet potatoes, cassava and pumpkins when available are boiled or roasted with or without groundnuts or muzauli. The oil in the muzauli and groundnuts raises the energy levels of the food, while groundnuts also raise the protein content of the meal while improving the palatability. This means that the breakfast of the people of Mongu is generally of higher energy content and sometimes higher protein content than that of the people in the other study areas.

5.1.2.2 Lunch, Supper, Main Meal Foods

Zone I Siavonga

Tonga and Goba people of Siavonga, the main meal is in the evening and nshima is the major source of energy (carbohydrate). The nsima is prepared from sorghum, millet, and maize, with sorghum and millet being more preferred than maize because ‘the sensation of fullness lasts longer and so frequent meals are not necessary’. In lean periods mpunga or lusitu grass, wild roots and leached poisonous tubers (chaama) and leaves are processed into flour for nshima. Nshima is consumed with vegetables or meat or fish relish. Lunch is similar to breakfast or evening meal for those with more food. With a cropping season of two to four (2-4) months in a year there usually isn’t enough staple for the preparation of three meals in a day. The main energy and protein consumption is therefore, usually from the main meal. In lean periods people skip days without eating for the little food they have to stretch out.

Zone II Mongu

Access and availability of foodstuffs for consumption by the people of Mongu is greatly influenced by ethnicity. The Lozi tribal group in Mongu district dominates the Barotse Flood Plain where seasonal flooding of the Zambezi River occurs. The Lozi tribal group in the district controls fishing, cattle rearing, crop production**,** and harvesting of foodstuffs from the natural fauna and flora of the Flood Plain. The Mbunda in the uplands have more access to forest foodstuffs such as mushrooms and wild fruits. Both the Lozi and Mbunda

grow more or less the same vegetables, most of which are not indigenous to the area. Markets play a vital role in distribution of different types of foodstuffs to those who would normally do not have access to them.

The most preferred staple for preparation of nshima for the Lozi people is maize, although they will use rice sorghum and cassava if maize supplies are limited. Several wild tubers are harvested from the flood plains in times of scarcity. Cassava is the main staple food for the Mbunda people in the highlands. Cassava is regarded by the Lozi as food for poor people. The Lozi have developed traditional recipes of food preparation, which greatly utilize fermentation to produce dishes characterized by distinct flavours (e.g. fermented fish) or by a sour taste (e.g. sour milk, sour porridge).

Savoury dishes consisting of meat and fish, sometimes mixed with vegetables and mushrooms are also highly preferred. The eating of vegetables, legumes or mushrooms cooked alone as relish has for a long time not been culturally acceptable. Generally the people of Mongu find the use of vegetables and mushrooms as relish to make a rather dull tasting combination with nshima. The vegetables or mushrooms are consumed as the main relish only when fish, meat or sour milk are scarce. Insects such as inswa and caterpillars are still not much accepted as food. The most preferred wild fruits are those that have several uses including incorporation into several dishes while cooking (e.g. muzauli, mukuwa, mongongo and mubula (*Parinari curatellifolia*). The Lozi food preparation methods, which involve fermenting of some foods and the combining of foods from various food groups to make a dish, are highly nutritious in terms of energy, protein, vitamin and mineral content.

The general diet of the Lozi people is highly nutritious and can be considered luxurious by rural Zambian standards. The people of Mongu have a rich but highly conservative culture which has led to most of their foods and preparation methods being little known in other parts of the country.

Zone III Kasama

Nshima is made from cassava, maize or millet flour. Sweet potatoes, Pumpkins, gourds are consumed when available. The nshima is eaten with vegetables, mushrooms, legumes or insects as relish. It is normal for several vegetables to be mixed when cooking. With 10 wild okras (delele), 13 caterpillar species and a long list of mushrooms collected from the wild the Bembas of Kasama appear to have great dependency on wild foods for their relishes. Most of these forest foods are sun dried to preserve them for dry season use. Boiling is the most common method of preparation for vegetables, legumes and mushrooms.

Addition of groundnuts to foods makes otherwise ordinary tasting foods into delicacies and is widely practiced for fresh and dry vegetables, fresh and dry mushrooms, dry caterpillars and fresh sweet potatoes. Soda (sodium bicarbonate) is added to a lot of relishes to make them soft (e.g. pumpkin leaves), change colour (e.g bungusa-mushroom) reduce poison in the food (e.g. cassava leaves) or improve the taste of foods cooked in groundnuts. The addition of sodium bicarbonate to vegetables destroys vitamins. The amount of rainfall in Zone III encourages tree growth at the expense of the growth of grasses and leafy vegetables in the forests. Consequently animal rearing is not common and meat is a

relatively rare component of the diet. Chickens have traditionally been about the most common livestock reared. The dietary level of animal protein is generally low. The main source of protein in the diet is therefore, food legumes and occasionally insects and fish for those near the water, although fish is mostly sold for cash.

Traditional food preparation methods for consumption are otherwise uncomplicated, mainly consisting of boiling and roasting. Western influence on culture may have led to the abandoning of some traditional recipes. The Bemba people of Northern Province are known to be aggressive in imparting their culture to other people and are quite accommodating to new ideas. The result is that a good number of traditionally Bemba foods are widely consumed in Zambia.

Zone III Solwezi

The tribal lines of the Kaonde and the Lunda are highly pronounced. The two tribes each have their own selection of staples and vegetables that they eat; and culturally it is objectionable to be associated with the other tribe's foods! Cassava is the main staple for the Lunda people of North Western Province while for the Kaonde people it is sorghum. Cassava is generally considered by Kaondes as food for poor people or for the low class of society. Katolo is one of the most preferred vegetables by the Lunda people. The Kaonde regards it as a vegetable for women. The relationship between the Lundas and Kaondes is perpetually confrontational with individuals from each tribe challenging those of the other tribe at the slightest opportunity. Generally the two tribes appear to try and keep away from the other tribe’s foods.

Lunch and supper foods consist of nshima and relish. Nshima is prepared preferably from cassava, sorghum or millet by the Lunda people. The order of preference for the Kaonde people being sorghum, maize or finger millet. The Kaonde mainly consume cassava in the rainy season (December to January) when the cereals are scarce. Preparation methods of the relishes for the two tribes also involve boiling just like those of the Bembas of Kasama, except that groundnuts are not combined with other foods as often. Since the people of Solwezi do a lot of business selling agricultural produce to buyers from the Democratic Republic of Congo, they usually have cash at hand to purchase cooking oil. The vegetables are therefore cooked more with cooking oil than with groundnuts. Soda is only used in the few okra varieties consumed. Due to the same reasons of high rainfall favoring tree rather than grass growth and availability of game, animal rearing is not a common practice. Game meat is, however, quite abundant and is reported to be harvested illegally. The people of Solwezi, therefore appear to have more meat protein in their diet than the Bembas of Kasama. They however, have fewer caterpillars and fewer bean varieties in the diet although beans grow well, they are mostly grown for sale.

5.1.2.3 Snack Foods

The Tongas and Gobas consume fruits as snacks, mainly raw. The Bembas Kaondes and Lundas eat boiled or roasted sweet potatoes, fresh cassava; or pumpkins as snacks. Fruits are also eaten as snacks when available. These tribes tend to resort, more often, to ready-to-eat raw foodstuffs or those that just need boiling. The Lozis and Mbundas consume Scones made from staples as well as exotic and local fruits as snacks, in-between main meals.

5.1.2.4 Beverages

Beverages made by all ethnic groups from cereals/staples, with or without root extracts, include sweet beer (chibwantu, Tonga; Munkoyo, Bemba) and hard liquor or alcoholic beverages including seven days (opaque beer) and distilled spirits like kachasu. Fruits are also processed into cider (fermented juice) and spirits by the Tonga, Goba, Lozi, Nsenga and Mbunda tribes who have a long history of drinking strong liquor.

6.0 PAPERS AND OTHER RESEARCH FROM THIS RESEARCH

The results extracted from this research have been published and presented at other for a.

6.1 A paper on "Nutrient Composition Of Selected Common Local Food Stuffs That Contribute To Food Security In Zambia" was presented at the FoodAfrica Conference on food security and use of natural resources in Younde, Cameroon (Nyirenda et. al., 2003).

6.2 A research project was funded by the Conservation Farming unit of Ministry of Agriculture and Cooperatives based on one of the identified foodstuffs; velvet beans. Velvet beans has been promoted for enriching and conditioning the soil as green manure for small scale farmers. However, there was a lot of beans produced without use because of the anti-nutrient, L-Dopa. The research was commissioned to find processing methods that could extract the L-Dopa at small scale farmer level. Processing the beans involving soacking and boiling proved good for beans fed to broiler chickens (Nyirenda, Jonsson and Musukwa, 2002).

6.3 The Edible Plants project funded by UNICEF was a product of this research. In the growing need for finding cure and importance of nutrition in care and management of HIV/AIDS the researchers realized that collecting more information on medicinal value of edible plants would help in the fight against HIV/AIDS nutrition recommendation (Nyirenda, Epand, Musukwa & Habulembe Mugode, 2005).

6.4 The data from the food composition tables has been used in the National Guidelines for Nutrition Careand Support for People Living with HIV/AIDs by the National Food and Nutrition Commission (NFNC, 2003).

6.5 The data from this research was used in the development of a chapter on nutrition in regional project funded by SIDA for learning material on HIV/AIDS for University students in health, agriculture and other life sciences.

This proves the importance and need to analyse all the foodstuffs identified in this research and include them in the Food Composition Tables.

7.0 CONCLUSION

The results of this research have confirmed that existing information on foodstuff nutrients has a lot of gaps and that a lot of foodstuffs have not yet been analyzed. Those foodstuffs analyzed by research institutions and industries were very specialized and did not provide meaningful information to include in the food tables. The current Zambian food composition tables are not inclusive of many important common local foods.

A wide variety of foodstuffs grow in the different ecological zones. The communities prioritise foodstuffs according to preference, importance and availability. Preference was usually influenced by availability that also influences importance of the foodstuff especially in hunger/lean periods any foodstuff becomes important.

Food processing method and technologies at community level had not evolved greatly. Processing was almost limited to pestle and mortar, and grinding stone and beer brewing. Hammer mills are also available for maize and sorghum (maila). Bulrush millet (Nzembwe) is exclusively stone ground on a daily basis for the desired fineness and fresh flavour. Some vegetables are also ground and potash and soda are used for flavour and softening, especially the tree leaves.

The staples are made into hard (nshima) or soft porridge. Relishes are eaten with nshima. Leafy relishes are usually ground and salt, soda/potash and/or groundnuts added if available. Very little oil is used due to non-availability, expense and access. Beverages from the cereals staples include sweet beer (chibwantu) and hard liquor or alcoholic beverages including seven days (opaque beer) and locally distilled spirits like kachasu.

The nutrient composition results indicate that a lot of high nutrient foodstuffs such as leafy vegetables, caterpillars, mushrooms and fruits exist. However, most of these are short season and not much preservation is done to spread their consumption throughout the year.

The green leafy vegetables varied in protein content which was much higher than some of the beans and similar to or higher than groundnuts (table 15). The cereals, tubers and roots had lower protein levels in that order (table 15). Cassava leaves had the highest crude protein content followed by the black jack and bean leaves. The different caterpillars had different crude protein levels but all were higher (35-58.6%CP) than the leafy vegetables (21-35%CP) and beans (18-24.5%CP). The mushrooms also showed appreciable amounts of crude protein content (18-30.6%CP).

The caterpillars showed higher crude oil content (7.6-24.5% EE) and Gross Energy (4.8-6.1 kcal/g) but were less than groundnuts (39.7 EE and 6.5 Kcal/g) respectively.

Cassava leaves showed very high levels of apparent vitamin C (ascorbic acid) than all the other foodstuffs. Some vegetables such as pumpkin, sweet potatoes leaves and black jack leaves contained high apparent iron.

Boiling tended to reduce crude protein, crude oil, Gross Energy and vitamin C but showed an increase in apparent iron levels in selected common vegetables (Table 17).The addition of ground nuts with or without sodium bicarbonate reduce vitamin C to trace levels that

were not detectable.

Adding Ground nuts increased the protein (from 18 % in boiled – 32% CP) and oil (from 3.2-7.1 to 32-40.1% EE content and Gross Energy as consequence of increased oil.

The fruits analysed showed variability in nutrient composition. The Mungongo fruit had high protein and oil content at 23.5% and 57.4%^crude protein, respectively and followed by Muzauli (12.1% CP and 35.1% oil, respectively). Both fruit trees were from Western Province and are used extensively as condiments in various dishes. Muzauli was used to give yellowish colour, aroma and oil to the sweet potatoes and relishes. Ngai and Masau, which are both sweet and sour fruits, had high quantities of vitamin C, 303mg and 290mg, respectively. Except for Mango and Ngai fruits, which had low iron content, the rest had comparatively higher iron content.

These nutrient contents show the potential for increased utilization of these foodstuffs for improving the nutritional status of the communities living in these areas. However the influence of ethnicity is strong. A food for one ethnic group is looked down on by another, either as a sign of being too poor to afford better food or simply because the food is eaten by a rival ethnic group. Also from the focused group discussion some foodstuffs were not recognized as food by different communities. Thus the food base would be widened if such foods were shown and people were taught on how to prepare them.

The eating habits of the different ethnic groups differ markedly. Many of the rural inhabitants however, have retained their indigenous and traditional customs and values. Rural lifestyles are highly dictated by the surrounding natural resources, which depend on climatic factors such as precipitation and prevailing temperatures. However, in many instances loss of traditional knowledge has been lost because the young go to school and have not learnt how to prepare certain dishes, particularly those that contained poisonous substances.

The research also highlighted the different roles played by the different members of the family in collecting different types of food. Mushrooms, wild vegetables and fruits are normally collected by children, where they are available but because of economic gain near urban areas, many women spend long hours gathering mushrooms for market. In farming communities, mushroom gathering tends to compete with weeding period.

The number of meals consumed in a day and foods eaten varies from one ethnic group to another. The Lozi, Mbunda, Kaonde and Lunda ethnic groups consume three meals a day, i.e. breakfast, lunch and supper. The Bemba speaking people usually only have breakfast in the morning and a late afternoon main meal ‘’because the women are too busy during the day to prepare meals’’. For the Bemba there is no difference between foods eaten at different times of the day. Any type of food can be eaten at any time, if available. The Tonga and Goba speaking people of Siavonga may have breakfast, but usually have one main meal in the late afternoon or early evening. Snacks and beverages if available, are consumed at unspecified times during the day or where distinct breakfast and lunch is not eaten.

7.0 RECOMMENDATIONS

- There is need for analyzing all the foodstuffs that were identified and even some that may not have been identified.
- It is important for the future to determine the bioavailability of some of the high nutrients contained in some foodstuffs such as the vegetables, caterpillars, mushrooms and fruits.
- More research is required on the 'Influence of cultural food habits and acceptability on nutrition of tribe/s or social groupings'.
- There is need for dissemination of the information collected on availability calendars and methods of processing, preservation and utilization to stakeholders and institutions involved in nutrition information dissemination, training and research.
- There is need to publish this research so that many people can benefit, particularly community based organizations involved in the feeding of malnourished children and those suffering from diseases such as HIV/AIDS, Malaria and other debilitating diseases that could benefit from good nutrition status.
- It is important to promote the consumption, propagation and production of the nutritious underutilized foodstuffs in order to increase diversity and the food base of the people.
- The revised food composition tables need to be presented to relevant institutions so that they know they are available.
- The researchers need to repackage this information into specialized use modules and make it available for use.

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ANNEXES

ANNEX 1: FOOD CALENDARS

4.0 ZONE 1 Siavonga calenders

4.1 CHILINDI Calender 1 Zone1

Local name	Common name	Scientific Name	Month Available											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1.Staples														
Bboobboo	Pumpkin	*Cutrus vulgaris*	x	xxx	xxx	xxx	xxx	xxx	x					
Bukowa			x				x	xxx	xxx	xxx	xx	xx	x	x
Bwengo	Sesame seeds	*Ceratotheca sesamoid*	x				xxx	xxx	xxx	xx	xx	xx	xx	x
Chimowa	Wild spinach	*Amaranthus dubris*	x											
Delele	Okra	*Hibisus esculentus*	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
Maila	Sorghum	*Sorghum licolor*	x	x	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xx
Mapopwe	Maize	*Zea mays*		x	xxx	xx	x							
Mundyoli												xxx	xx	x
Ndongwe	Groundnuts	*Arachis hypogea*			xxx	xxx	xxx	x						
Nyaba			x	x	xx	xxx	xxx	xx	xx	xx	xx	xx	x	x
Nzembwe	Millet	*Eleusine africana*	x	x	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xx	x	x
Shungwa	Cat's whiskers	*Cleome gynandra*	xxx	x										
2. Relishes														
Ndyu (Mushrooms)	Mushrooms			x	x									
Tomato	Tomato	*Lycopersicum esculantum*	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
Rape	Rape	*Brassica rape*	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx

Local name	Common name	Scientific Name	Month Available											
			Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
2. Meats														
Dada	Ducks							ALL YEAR						
Inswa	Termites		xxx											xxx
Inswi	Fish							ALL YEAR						
Kwilimba	Doves							ALL YEAR						
Maande			xxx											xxx
Madyuntila				x	xxx	xx								
Mbeba	Rodent					x	xxx	xxx	xxx	xxx	x	x	x	
Mbelele	Sheep							ALL YEAR						
Mpongo	Goat							ALL YEAR						
Nkanga	Gunea bird							ALL YEAR						
Nkuku	Chicken							ALL YEAR						
Sabundwa				x	xxx	xx								
Zilinda	Water melon	*Cruciferae melo*						ALL YEAR						
3. Fruits														
Banana	Banana	*Musa sapientia*						ALL YEAR						

Local name	Common name	Scientific Name	Month Available											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Buchi	Honey							ALL YEAR						
Busika	Tamarinda	*Tamarindus indica*	xx	xx	x		x	xxx	xxx	xxx	xxx	xxx	xxx	xxx
Chingachinga							xxx	x						
Humo													xxx	
Lwiidi	Hausa potato	*Plectranthus esculentus*						ALL YEAR						
Maabo		*Strychnos innocua*											xxx	x
Mabuyu	Baobab	*Adansonia digitata*			xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xx	x
Mafufwe								ALL YEAR						
Makuli								ALL YEAR						
Manego									xxx	xxx	xx	xx	x	
Mankondole			xx	xx	x		xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
Mapoposhi	Pawpaw	*Carica papaya*						ALL YEAR						
Masau	Indian jujube	*Ziziphus mauritiania*			x	x	x	x	xxx	xx	x			
Mateme			x										x	xxx
Matondo			x											xxx
Mbubu					x	xxx	xxx	xxx						
Mbwila	Mbambara nuts	*Leguminosae subterranea*			xxx	xx	x							
Mpombolo				xxx	x									
Mwanja	Cassava	*Manihot esculeta*						ALL YEAR						

Local name	Common name	Scientific Name	Month Available											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Nabuya								ALL YEAR						
Nchenje									x	xxx				
Njiiyi			x	xx	x									
Njoongwa							x	xx	xxx	xxx	xxx	xxx	xx	
Nkunyukunyu						x	xxx	xxx	xxx	xxx	xxx	xxx	xx	x
Nkuyu	Fig tree fruits							ALL YEAR						
Nsangu											x	xxx	xxx	
Sikili			x											xxx
Sozwe											x	xxx	x	

3.2 KADEMAUNGA Calender 2 Zone 1

Local name	Common name	Scientific name	Month available											
			Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
1. Staples														
Deregoba	Okra		x											x
Mabuyu	Baobab	*Adansonia digitata*				xx	x	x	x	x	x			
Maila	Sorghum	*Sorghum licolor*	x	x			xx	xxx	xxx	xxx	xxx	xx	xx	xx
Mandapanda														
Mapoka	Maize	*Zea mays*			xx	xxx	xxx	xx	xx	x				
Mphunga	Rice	*Oryza sativa*	xx	xxx										
Musonde			xx	xxx										
Nzembwe	Bulrush millet	*Pennisetum nigritarum*			xxx	xxx	x							
Sozwe/ Nunguwe'											xx	xx	x	
Tsangu												x	x	
Tsiiyu														
Wakwala/ Nkwakwa														
2. Vegetables														
Chakaka														x
Chimowa	Wild spinarch	*Amaranthus dubris*	x	xxx	x									
Deberebe	Okra											x	xxx	
Fulanondo														x

Local name	Common name	Scientific name	Month available											
			Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Matuaselwe			xx											xx
Mooko													x	
Mundyoli												xxx	xxx	xxx
Mutezi Delele			x	x	x	x	x	x	x	x	x	x	x	x
Nyemba	Cowpeas		xxx	xxx	xx	x	x	x	x	x	x	x	x	x
Suuna			xxx	x										
3. Fruits														
Busika										x	xxx	xx	x	
Mabuyu	Baobab					x	xx	xxx	xxx	xxx	xx	xx	x	
Manego										x	xx	x		
Masau	Indian jujube								xxx	xxx	xxx			
Matondo														xx
Munyii				x	x									
Ngaye					x	xxx	x							
Nkolondo					xxx	x								
Nkunyukunyu														
Nteme													xxx	x

3.3 SANGWEMU Calender 3 Zone 1

Local name	Common name	Scientific name	Month Available											
			Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Amadyaki														
Amangobwa			x	x										
Banana	Banana	*Musa sapientia*	xx	xx	xx	xx	x	x	x					
Bonko	Wild spinach	*Amaranthus agustifolius*	xxx	xxx	x									
Bowa	Mushrooms	*Agancus spp*	xxx	xx	x									
Buchi	Honey											xx	xx	
Busiika	Tamarinda	*Tamarindus indica*								xxx	x	x		
Cabbage	Cabbage	*Brassica oleracea*				x	x	x	x	xxx	xxx			
Chimbwale	Sweet potato	*Impomoea batata*				x	x	x	x	x	x	x	x	
Magwili	Irish potato	*Solanum tuberosum*											xxx	xx
Gwaba	Guava	*Psidium guajava*			x	x								
Hachipa	Black jack	*Bidens pilosa*	xxx	xxx	x									
Inswa	Termites		x										x	x
Inswii	Fish		x	x	x	x	x	x	x	x	x	xxx	x	x
Intumbulwa	Indian plum	*Flacourtia indica*				x	x							
Kabuyuyu													xxx	
Kalembula	Sweet potatoe leaves	*Impomoea batata*	x	x	x	x	x	x	x	x	x	x	x	x
Kapenta			x	x	x	x	x	x	x	x	x	x	x	x
Lumya			xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
Lwidi	Hausa potato	*Pleatranthus esculentus*			xx	xx	xx	xx	x	x	x	x	x	
Maabo		*Strychnos innocua*										x	x	x
Mabuyu	Baobab	*Adansonia digitata*				x	X	x						

Local name	Common name	Scientific name	Month Available											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Magonkonyo					x	xx								
Maila	Sorghum	*Sorghum licolor*	x			xxx	xxx	xxx	xxx	xxx	xxx	xx	x	x
Maize Meal (Nshima)	Maize meal	*Zea mays*	x			xxx	xxx	xxx	xxx	xxx	xxx	xx	x	x
Makowa	Cucumber	*Cucumis sativus*		x	x									
Mango	Mango	*Mangifera indica*	x										x	xxx
Masau	Indian jujube	*Ziziphus mauritiania*					x	x	xx	xx				
Masuku	Wild loquat	*Uapaca kirkiana*	x										x	xxx
Matanga					x	x	x							
Matobo	Wild pear	*Dombeya rotundifolia*						x	xxx	x				
Mbeba	Rodent								x	x	x			
Misale Ya Maila	Sorghum sugar cane	*Sorghum licolor*			x	xx	xx							
Miyungu					x	x	x							
Mpoko		*Erythrococca menyharthii*			x	x	x							
Muchingachinga		*Popowia obovata*				x	x						xxx	xx
Mundyoli		*Triplochiton zambesiacus*				x	x	x						
Muntili													xxx	xx
Mwanja	Cassava	*Manihot esculeta*	x	x	x	x	x	x	x	x	x	x	x	x
Namunwa	Water melon	*Cruciferae melo*				x	x	x						
Nchaja														
Nchenje										x				
Ndulwe								x	x	x	x	x		
Ngaye						x								
Ngombe														

Local name	Common name	Scientific name	Month Available											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Njama/Mpama	Yam				x	x	x	x	x	x	x	x	x	
Njiiyi				x	x	x								
Nkolondo						x	x	x						
Nonyamenda												x	x	x
Ntalala						x								
Nteme			x											x
Nyabo	Cow peas	*Vigna unguiculata*		xx	xxx	xx	xx	xx	xx	x	x	x		
Nyama	Meat		x	x	x	x	x	x	x	x	x	x	x	x
Nyemu	Groundnuts	*Arachis hypogea*			xxx	xxx	xx	xx	x	x	x	x	x	
Nyenzi			x										x	x
Pawpaw	Pawpaw	*Carica papaya*								x	x			
Potatoes	Potatoes	*Solanum tuberosum*												
Pumpkin Leaves	Pumpkin leaves			xxx	xxx	xx	x							
Rape	Rape	*Cucumeropsis edulis*				x	x	x	x	xxx	xxx	x		
Sunkunan / Ntoyo	Mbambara nuts	*Leguminosae subterranea*				x	x							
Tomato	Tomatoes	*Lycopersicum esculantum*	xx	xx	xx	xx	xx	xx	xx	xxx	xxx	x	x	x

ZONE 2 **Mongu Calenders**

Local name	Common name	Scientific name	Month Available											
			Jan	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**
Lindowa								xx	xx	xxx	xxx	x		
Linjefu	Water lily		xx	xxx	xxx	xxx								xx
Lukesha	Finger millet	*Eleusine aflicana*			xx	xx	x	x	x	x	x	x	x	
Mabele	Sorghum	*sorghum licolor*					xx	xx	xx	x	x	x	x	x
Mahwahwa												xx	xxx	x
Makwangala									xx	xxx	xxx	x		
Mambongo														
Mampana									xx	xxx	xxx	x		
Maoma														
Mashela														
Mauza	Bulrush millet	*pennisetum nigritarum*			x									
Mbonyi	Maize	*Zea mays*	xxx	xxx	xxx	xxx	xx	x	x					xx
Mubula	Hissing tree, mobola plum	*Parinari curatelliofolia*												
Mumosomoso														
Mwanja	Cassava	*Manihot esculeta*	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
Ngulu	Sweet potato	*Impomoea batata*	x	x	x									
Rice	Rice	*Oryza sativa*	xx	x	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	x	xx
Sikuswani														
Relishes														
Local name	**Common name**	**Scientific name**												
Hopani	Water monitor													
Kandambwila	Sweet potato leaves	*Impomoea batata*												

Local name	Common name	Scientific name	Month Available											
			Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Kapenta	Kapenta													
Kashimbandala			x											xxx
Kubu														
Kulu											xxx	xx	x	xxx
Libowa													xxx	xxx
Liku			x	xxx	xxx	xxx	xxx	xxx	x	x	x	x	x	
Lindondwe														
Linyunya														
Litapi			xx	xx	xx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xx	xx
Litindi														
Litokola														
Lituu	Mbambara nuts	*Leguminosae subterranae*	x	x	xxx	xxx	x	x	x	x	x	x	x	x
Lumuna														
Mabisi	Sour milk		xxx	xx	x							xxx	xxx	xxx
Manawa	Beans	*Phaseolus lunatus*			xx	xx	x	x	x	x	x	x	x	x
Mangambwa	Pumpkin leaves	*Cucumeropsis eduli*	xxx	xxx	xxx	xxx	xxx	xxx	xx					
Mbowa	Mushrooms	*Agancus spp*												
Nakandama	Mushroom	*Agancus spp*	x	x	x									
Nama			xxx	xxx	xxx	xxx	xxx	xxx	xx	xx	xx	xx	xx	xx
Ndongo	Groundnuts	*Arachis hypogea*		x	xxx	xxx	x	x	x	x	x	x	x	x
Nwindwi	Mushrooms	*Agancus spp*	xx	x										x
Rape	Rape	*Brassica rape*				x	xxx	xxx	xxx	xx	xx	x	x	x
Shombo	Cassava leaves	*Manihot esculenta*	xxx	xxx	xxx	xxx	xxx	xx	xx	xxx	xxx	xxx	xxx	xxx
Sichikwele			x	x	x	x								xxx
Sichongwani														
Sichungwa	Cat’s whiskers	*Cleome gynandra*												

Local name	Common name	Scientific name	Month Available											
			Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Silutoko			x	x										x
Sindambi	Roselle	*Hibisicus esculentus*	xxx	xxx	xxx	xx	x	x	x	x	x	x		
Tepe													xxx	xxx
Zondwe	Mushroom	*Agancus spp*	x	x	xx	xx	xxx	xxx	x					x
Fish			x	x	x	x	x	xx	xxx	xxx	xxx	xxx	xx	x
Inswa	Termites													
Lipeba														
Mahungu														
Mai akwena	Crocodile eggs	*Crocodilidae niloticus ssp*												
Shakame	Kalulu													
Sumbi														
Fruits														
Bananas	Banana	*Musa sapientia*												
Cashew	Cashew nuts	*Annacardium occidentale*										x	xxx	x
Guava	Guava	*Psidium guajava*	xxx	x	x								x	xxx
Lemon	Lemon	*Citrus limon*						x	x					
Manbongolume			x	x	x									x
Mango	Mango	*Mangifera indica*	x	x										xxx
Muhamani			x									x	xxx	xxx
Mukekete							x	xxx	x			x	xxx	
Mukuwa						x	x	xxx	xxx	x				
Mulolo							x	x	x	x				
Mumbole														
Mumbulwembulwe							x	xxx	x	x				
Mumbundwe			x	x	x									x

Local name	Common name	Scientific name	Month Available											
			Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Munbwengelengwe								xx	xxx	x				
Munjongolo												xx	xxx	x
Mutoya			x	x	x	x	x	x	x	x	x	x	x	x
Muzauli											x	xxx	x	
Mwangalala							x	x	x	x				
Namulomo				x	xx	xxx	x							
Nswee														
Oranges	Orange	*Citrus sinensis*		x	x									
Paw paw	Paw paw	*Carica papaya*	x	x	x	x	x	x	x	x		x	x	x
Pumpkins	Pumpkins	*Cutrus vulgaris*	xxx	xxx	xx	x								xxx
Sugarcane	Sugar cane	*Saccharum spp*		x	x									

ZONE 3 Solwezi calenders

Kayonge camp, Mutanda Block.

Foodstuff			**Month available**											
Local name	**Common name**	**Scientific name**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
STAPLES														
Mebele	Sorghum	*Sorghum licolor*						x	xx	xxx	xxx	xx		
Makamba	Cassava	*Manihot esculenta*	x	x	x	x	x	xxx	xxx	xxx	xx			x
Mataba	Maize	*Zea mays*						x	xx	xxx	xxx	x		
Luku	Finger millet	*Eleusine aflicana*						x	xx	xxx	xx			
Chingovwa	Sweet potatoes	*Impomoea batata*		x	xx	xxx	xxx	xxx	xxx	xxx	xx	x		
RELISHES														
Nkunde	Beans	*Phaseolus vulgaris*	x	xxx	xx	x	x	xxx	x	x	x	x	x	x
Sampu	Bean leaves	*phaseolus vulgaris*				xxx	x						xx	xxx
Mpwa			xx	xxx	xxx	xx	x							x
Kalembula	Sweet potato leaves	*Impomoea batata*	xxx	xxx	xxx	xxx	x				xx	xxx	xxx	xxx
Bishu	Pumpkin leaves	*Cucumeropsis eduli*	xxx	xxx	xxx	xxx	x	x						xxx
Katolo	Roselle	*Hibiscus meeiser*	x	xxx	xxx	xxx	x				xx	xxx	xxx	xxx
Matamba	Cassava leaves	*Manihot esculenta*	xxx	xxx	xxx	xxx	xx					xx	xxx	xxx
Nzolo	Chicken		x	x	x	xx		xxx	xxx	xxx	xx			x
Matemate	Tomato	*Lycopersicum esculantum*			x	xx	xxx	xxx	xxx	xxx	xxx	xxx	xx	x
Mulembwe/Kiswita	Okra	*Ceratotheca sesamoides*	xxx	xxx	xxx	xx					x	x	xx	xxx

Foodstuff			**Month available**											
Local name	**Common name**	**Scientific name**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Pupwe	Okra	*Zanthoxylum chalybeum*	xxx	xxx	xxx	xxx	xxx	xx				x	xxx	xxx
Ndindingoma	Okra	*Corchorus olitorus*	xxx	xxx	xxx	xx								
Musebo			xx	xx	x	x	x					x	xx	xxx
Musabi			x	x	x	xx	xx	xxx	xxx	xxx	xx	x	x	
Baankala	Crabs								x	x	xxx	xxx	xxx	
Bwengo	Sesame seeds	*Sesam indicum*						x	xx	xxx	xxx	xxx	xxx	
Lunga camp, Lunga Block														
MUSHROOMS		(Agancus spp)												
Busangwa	Mushroom				x									
Busununu	Mushroom		x	x	x	x								
Chipampe	Mushroom		x											
Kachilechile (Chitondo)	Mushroom		x	x	x	x								
Kamanse	Mushroom		x	x	x	x								
Kamena makanka	Mushroom		x	x	x									
Kankolekole	Mushroom		x	x	x	x								
Kapomso	Mushroom		x	x										x
Kasukwa	Mushroom													x
Katoto	Mushroom										x			
Kamanse (Kabanse)	Mushroom				x	x								
Kiyinka	Mushroom		x											x
Mumpukutu	Mushroom		x	x	x									x
Munya (kaonde) or kalela (lamba)	Mushroom		x											x

Foodstuff			**Month available**											
Local name	**Common name**	**Scientific name**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Musefwe (Busefwe)	Mushroom		x	x	x									x
Ndelema (Tente)	Mushroom		x	x	x									x
Nkulumbwe	Mushroom		x											x
Shinkula (lamba)	Mushroom				x									
Tande	Mushroom		x											x
Tanga	Mushroom													

Lunga camp, Lunga Block

Local name	**Common name**	**Scientific name**	**Month available**											
			Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Fruits													x	
Nkofwa														
Mikuyu	Fig tree fruits	*Ficus capenis*	X	X	X	X	X	X	X	X	x	x	x	x
Mpundu	Mobola Plum	*Parinari curatelliolia*									x	x		
Nkulupya					X	X								
Makole	Wild pear	*Dombeya rotundifolia*								X	x	x		
Musole			X											x
Bukufuti											x	x	x	x
Nkolobondo						X	X	X	X					
Malubeni	(Mulberry)	*Morus nigra*	X	X	X	X	X	X	X	X	x	x	x	x
Mpaawa													x	x
Mwenge						X	X	X	X					
Kinanashi	Pineapple	*Ananas comosus*												

Local name	Common name	Scientific name	Month available											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mango	Mango	*Mangifera indica*												
Mapela	Guava	*Psidium guajava*			x	x	x	x	x	x				
Orange	Orange	*Citus sinensis*						x	x	x				
Tusongole/Tupwi											x	x	x	x
Insafwa														
Imfungo		*Kigelia africana*	x	x							x	x	x	x
Makusu (Masuku)	Wild loquat	*Uapaca kirkiana*									x	x	x	x
Mankulwiba									x	x				
Nsokolela												x	x	x
Tungulu								x	x	x	x	x		
Mabungo													x	x
Miindo													x	x
Makonkola												x	x	x
Nsombojojo					x	x								

FOOD AVAILABILITY CALENDAR - KASAMA

Local name	**Common name**	**Scientific name**	**Month available**											
			Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
STAPLES														
Mataba Fresh	Maize	*Zea mays*		xx	xxx	xx	x							
Mataba dry	Maize	*Zea mays*					x	xx	xxx	xxx	xx	xx	xx	x
Amale	Millet	*Eleusine Aflicana*				x	xxx	xxx	xxx	xxx	xxx	xxx	xx	
-Mangwe					x									
-Mutubila					x									
Amasaka	Sorghum	*Sorghum licolor*						xx	xxx	xx	x			
-Sonkwe														
-Ayakashika														
Rice		*Oryza sativa*	x	x	x	x	x	x	x	x	x	x	x	x
Tubers														
Tute/Kalundwe	Cassava	*Manihot esculeta*	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
Fyumbu	Sweet potatoes	*Impomoea batata*				x	xx	xxx	xxx	xxx	xxx	xxx	xx	x
Filashi	Irish potatoes	*Solanum tuberosum*	x	x	x	xx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xx
Chikanda	Orchid roots													
-Matibula				"										
-Kalobo				"										
-Myala				"										
-Mishila mishila				"										
-Kamuti				"										
-Nsalu				"										
-Kasebelela/Busule				"										

Local name	Common name	Scientific name	Month available											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Legumes														
Mbalala Fresh	Groudnuts	*Arachis hypogea*			x	xxx	xxx	xxx	xx	x				
Dry	Groudnuts	*Arachis hypogea*				x	xxx	xxx	xxx	xxx	xxx	xxx	xx	x
-Mwapita			"											
-Solotoni			"											
Ntoyo/Mpolo Fresh	Bambaranuts	*Leguminosae subterranae*		x	x	xx	xx	xx						
Ntoyo/Mpolo Dry	Bambaranuts	*leguminosae subterranae*					xxx	xx						
Ilanda Fresh	Cowpeas	*Vigna unguiculata*			x	xxx	xx	x						
llanda dry	Cowpeas	*Vigna unguiculata*	x	x	x	xxx	xxx	xxx	xxx	xxx	xx	x	x	x
-Kaliso			"											
-Ilanda Yankulu			"											
Tongwe Fresh				x	xx	xxx	x							
Tongwe Dry			x	x	xx	xxx	xxx	xxx	xxx	xxx	xx	x	x	x
Soya Beans Fresh	Soya beans	*Glycine max*			s	x	xxx	x	x					
Soya Beans Dry	Soya beans	*Glycine max*						x	xxx	xxx	xxx	xx	xx	x
Mposo			x	x	xx	xxx	xxx	xxx	xxx	xxx	xxx	xx	x	x
Chilemba Fresh	Beans	*Phaseolus lunatus*	x	xx	xxx	xx	x							
Chilemba Dry	Beans	*Phaseolus lunatus*	x	xx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xx	xx
-Kambulaketi														
-Katulutua														
-Lusaka														
-Solwezi														
-Mafiyambwa														

Local name	Common name	Scientific name	Month available											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
-Meso Pasaka														
-Kalioka														
-Kansenga			x											
-White			x											
-Mandima			x											
Vegetables (Leafy)														
Chibwabwa Fresh	Pumpkin leaves	*Cucumeropsis eduli*	x	xxx	xxx	xx	x	x	x	x	x	x	x	x
Chibwabwa Dry	Pumpkin leaves	*Cucumeropsis eduli*					x	xx	xxx	xxx	xxx	xxx	xx	X
Chimpapila Fresh	Bean leaves	*Phaseolus vulgaris*	xxx	xxx	xxx	xxx	x							
Chimpapila Fresh	Bean leaves	*Phaseolus vulgaris*	xx	x	x	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xx	Xx
Kacheshya Fresh	Cowpeas	*Vigna unguiculata*	x	xx	xxx	xx	x	x	x	x	x	x	x	X
Dry	Cowpeas	*Vigna unguiculata*		x	x	x	xxx	xxx	xxx	xxx	xxx	xx	xx	X
Bondwe Fresh	Amaranthus		xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	Xxx
Kalebwe/Kalembula			xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	Xxx
Lubanga			xxx	xx	x									
Lunu Lungu Fresh	Pumpkin leaves		xxx	xxx	xxx	xxx	x							
Dry	Pumpkin leaves		xxx	x	x	xxx	xxx	xxx	xxx	xxx	xx	xx	x	X
Cabbage	Cabbage	*Brassica oleracea*	x	x	x	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	Xx
Rape	Rape	*Brassica rape*	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	Xxx
Chinese Cabbage	Chinese cabbage	*Brassica chinesis*			x	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	Xx
Chiban Nkode			xxx	xxx	xxx	xxx	xx	x	x	x	x	x	xx	Xxx
Musalumbumbi			xxx	xxx	xxx	xxx	xx	xx						Xxx
Katapa	Cassava leaves	*Manihot esculenta*	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	Xxx

Local name	Common name	Scientific name	Month available											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ntomgwe							xxx	xxx	xxx	xxx	xxx	xxx	xxx	Xxx
Ntanga							xxx	xxx						
Mpupu sha chipushi							xxx	xxx	xxx					
Mpolo							xxx							
Inkobwa												xxx	xxx	Xxx
Chigwilingwili													xxx	Xxx
Kooni			xxx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	Xx
Ilenge												xxx		
Nsululu			xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	Xxx
Kalubba			xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
Chinkofya			xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
Nkombwa			xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
Chifutuma					xxx	xxx	xxx	xxx						
Kanunka	Black jack	*Bidens pilosa*	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
Onion	Onion	*Allium copa*	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
Vegetables - fruits														
Tomato	Tomato	*Lycopersicum esculantum*	x	x	x	x	x	x	xxx	xxx	xxx	xxx	xxx	Xx
Amankolobwe	Cucumber	*Cucumis sativus*					xx	xx	xxx	xx	x	x		
Impwa	Egg plant	*Solanum macrocarpon*	x	x	xxx	xxx	xxx	xx	xx	xx	xx	xx	xx	Xx
Vegetables - roots														
Carrots	Carrots	*Daucus carrots*	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx

Local name	**Common name**	**Scientific name**	**Month available**											
			Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Vegetables – okra														
Okra (Mulembwe)														
Chilungutanda Fresh	Okra		xxx	xxx	xxx	xx								
Chilungutanda Dry	okra		x	x	xxx	xxx	xx	xxx	xxx	xx	xx	xx	xx	X
Kafulu Fresh	Okra			xxx	xx	x								
Kafulu Dry	Okra		x	x	xx	xxx	xxx	xxx	xxx	xxx	xxx	xx	xx	X
Kalembwe Katali Fresh	Okra	*Ceratothca sesamoides*		xxx	xx	xx								
Dry	Okra		x	x	xx	xxx	xxx	xxx	xxx	xxx	xx	xx	xx	X
Pumpwe Fresh	Okra	*Zanthoxylum chalybeum*												
Dry	Okra				x	x	x	x	x	x	x	x		
Lusakasaka Fresh	Okra	*Corchorus spp*		xxx	xxx	xxx	xxx							
Dry	Okra		x	x	xxx	xxx	xxx	xxx	xx	xx	x	x	x	X
Ndindigoma Fresh	Okra	*Corchorus olitorus*	xxx	xxx	xxx	xx								
Ndindigoma Dry	Okra				x	x	xx	xx	xx	x	x	x	x	X
Namatama Fresh	Okra		xxx	xxx										
Namatama Dry	Okra				x	x	x	x	x	x	x	x	x	
Mukonde Fresh	Okra		xxx	xxx										
Mukonde Dry	Okra			x	x	xx	xx	xx	x	x	x	x		
Mukole	Okra											xxx	xxx	Xxx
-Sololo	Okra		xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	Xx
-Chipolo	Okra		xx	xx										

Kasama Calendars – Mushrooms, Fruits, other plant foods

Local name	Common name	Scientific name	Month Available										
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Mushrooms (Bowa)													
Pampa Fresh	Mushroom			xx	xxx	xxx	xxx	xx					
Pampa Dry	Mushroom				x	x	xx	xx	x	x			
Bwalanda Fresh	Mushroom												
Bwalanda Dry	Mushroom												
Ubusefye Fresh	Mushroom		xxx	xxx									
Ubusefye Dry	Mushroom			x	x	x	x	x	x	x	x		
Chifukula Fresh	Mushroom												
Chifukula Dry	Mushroom												
Tente Fresh	Mushroom	*Amanita zambian*											Xxx
Tente Dry	Mushroom		x	x	x	x	x	x					
Chitondo Fresh	Mushroom		xxx										
Chitondo Dry	Mushroom		x	xx	xx	x	x	x	x	x			
Kabansa Fresh	Mushroom												
Kabansa Dry	Mushroom		xx	xx	x	x	x	x					
Chiteleshi Fresh	Mushroom		xxx										
Chiteleshi Dry	Mushroom		x	x	x	x	x	x	x				
Nkombo Fresh	Mushroom		xxx										
Nkombo Dry	Mushroom		x	x	x	x	x	x	x				
Pape Fresh	Mushroom		xxx										
Pape Dry	Mushroom		x	x	x	x	x	x	x	x	x		
Ichikolowa Fresh	Mushroom												
Ichikolowa Dry	Mushroom		x	x	x	x	x						
Chibengele Fresh	Mushroom		xxx	xxx	xxx	xxx							
Chibengele Dry	Mushroom			x	x	xx	xx	x	x	x	x	x	X
Tanda Fresh	Mushroom												

Local name	Common name	Scientific name	Month Available										
			Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**
Tanda Dry	Mushroom		x	x	x	x	x	x					
Samfwe Fresh	Mushroom		xxx	xxx	xxx	xxx							
Samfwe Dry	Mushroom		x	x	xx	xx	xx	xx	x	x	x	x	X
Lusasa Fresh	Mushroom		xxx	xxx	xxx								
Lusasa Dry	Mushroom			x	x	x	x	x	x	x	x		
Impufya Fresh	Mushroom		xxx										
Impufya Dry	Mushroom		x	x	x	x	x	x					
Munya Fresh	Mushroom			xxx									
Munya Dry	Mushroom												
Chotooli Fresh	Mushroom			xxx									
Chotooli Dry	Mushroom												
Kasendapukutu Fresh	Mushroom		xxx										
Kasendapukutu Dry	Mushroom												
Kolokondwe Fresh	Mushroom			xxx									
Kolokondwe Dry	Mushroom												
Tufita	Mushroom		*xx*	*x*									
Tunkulubi	Mushroom											*xx*	*Xxx*
-Bweshieshi	Mushroom		*xxx*										
-Chinsukwa	Mushroom		*xx*										
-Komo	Mushroom		*xx*										
-Bungusa	Mushroom		*xx*										
-Chituli	Mushroom		*xx*	*xx*	*xx*								
-Bufukula	Mushroom		*x*										
Fruits													
Masuku	Masuku	*Uapaca kirkiana*									x	xx	Xxx
Machungwa (Orange)	Orange	*Citrus sinensis*				xx							
Popo	Pawpaw	*Carica papaya*	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	Xx

Local name	Common name	Scientific name	Month Available										
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Ndimu (lemon)	Lemon	*Citrus limon*	x	x	x	x	x	x	x	x	x	x	X
Jack fruit	Jack fruit	*Artocarpus heterphyllus*		x	x	x	x						
Mpundu		*Parinari curatellifolia*					x	xxx	xxx	xxx	xx	x	X
Nkonde	Banana	*Musa sapirintia*	xxx	xxx	xxx	xx	xx	x	x	xx	xxx	xxx	Xxx
Minu/Songole	Corky-bark monkey orange	*strychcos coccolliodes*							xxx	xxx	xxx	xx	
Makomex									xxx	xxx	xxx	xx	
Amalungi		*Strychcos innocua*							xxx	xxx	xxx	xx	
Ndebe									xxx	xxx	xxx	xx	
Nsongwa								xxx	xxx	xxx	xxx		
Sonkolobe		*Uapaca sansibarica*						xxx	xxx	xxx	xxx		
Amapangwa										xx	xx		
Nkolobondo						xxx	xxx						
Nkundukubwila				xxx	Xxx								
Mfungo		*Kigelia africana*											Xxx
Matete													Xxx
Mpundu	Mobola plum	*Parinari curatellifolia*										xxx	Xxx
Makole	Wild pear	*Dombeya rotundifolia*	xxx	xx									Xx
Nsongwa			x	x	x	x	x	x	x	x	x	x	X
Ndebe			xx										Xx
Nsafwa													Xxx
Nkundukubwila		*Hexalobus monopelatus*	xxx	xxx	xxx								
Nsolobe													Xxx
Chisofu													Xxx
Amapela	Guava	*Psidium guajava*	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	Xxx
Amalumbwe								xxx					

Local name	Common name	Scientific name	Month Available										
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Amachungwa										xx	xx		
Nsanye			xx										
Mango/Yembe	Mango	*Mangifera indica*	xx										Xxx
Kotapela	Avocado	*Perssea americana*	x	xxx	xxx	xx	xx	x					
Seeds/Oils													
Sunflower	Sunflower	*Helianthus annus*							xxx	xxx	xxx	xxx	Xx
Pumpkin imyungu		*Citrullus vulgaris*	xx	xxx	xxx	xx							
Lungulungu				x	x	X	x	x	x	x	x	x	
Soya beans	Soya beans	*Glycine max*				xx	xx	xx	xxx	xxx	xxx	xxx	Xx
Beverages			x	x	x	X	x	x	x	x	x	x	X
Munkoyo	Munkoyo		x	x	x	X	x	x	x	x	x	x	X
Beer	Beer												
Unclassified													
Fipushi	Pumpkin	*Cucubita pepo*	x	x	Xx	xxx	xxx	xxx	xx	Xx	x	x	
Imyungu	Sweet gourds		xx	xxx	X								
Amankolobwe Fresh							xxx	xxx					
Amankolobwe Dry							xxx	xxx	xx	Xx	xx	x	X
Ifibimbi (Cucumber)	Cucumber	*Cucumis sativus*		xxx	Xxx								
Mankangala Fresh						xxx	xxx						
Mankangala Dry						xxx	xxx	xx	xx	xx	x	x	
Fisali	Sugar cane	*Saccharum spp*			x	xxx	xxx	xxx	xx	xx	x	x	

Local name	Common name	Scientific name	Month Available										
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Insects													
Fishimu	Caterpillars									xxx	xxx	xxx	Xx
-Tubambe				xxx	xx								
-Fikoso			xxx										
-Miyongolo							xxx						
-Mpambata			x	xxx	Xxx	xxx	xxx	xx					
-Namusuku			xx	xxx	Xxx	xxx	xxx	xx					
-Nsenya						xx	xx	xx					
-Chipimi												xxx	Xxx
-Mumpa													Xxx
-Fikoso												xxx	Xxx
-Miyongolo						xxx							
-Fitobo			xxx										
Namutebetebe												xxx	
-Kayonga											xxx	xxx	
-Impwepwe					Xxx	xxx							
Inyense		*Drthoptera gryllidae*	xx	xxx	X								
Tekute										xxx	xxx	x	X
Nshinge													
Inswa	Termites												
Fish													
Isabi	Bream	*tilapia /serranochronis spp*	x	x	x	x	x	x	x	x	x	x	X
Kapenta	Kapenta	*Limnothrissa stolothrissa*	x	x	x	x	x	x	x	x	x	x	X

Local name	Common name	Scientific name	Month Available										
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Animals/Birds													
Kapanga	Bush mice	*Muridae rattus*	x	x	x	x	x	x	x	x	x	x	X
Inkoko	Chicken	*Phasianidae gallus*	x	x	x	x	x	x	x	x	x	x	X
Inkwale			x	x	x	x	x	x	x	x	x	x	X
Makanga	Guinea fowl		x	x	x	x	x	x	x	x	x	x	X
Nkumba	pig	*Suidae sus*	x	x	x	x	x	x	x	x	x	x	X
Mbushi	Goat		x	x	x	x	x	x	x	x	x	x	X
Mpanga			x	x	x	x	x	x	x	x	x	x	X
N'gombe	Cattle		x	x	x	x	x	x	x	x	x	x	X
Mpembya							xx	xxx	xxx	xxx	xxx	xx	
Nshololo				xxx									
Nshinge			xxx										
Nkate						xx							
Kote			x	x	x	x	x	x	x	x	x	x	X
Nsengele			x	x	x	x	x	x	x	x	x	x	X
Akapale			x	x	x	x	x	x	x	x	x	x	X
Nsenshi			x	x	x	x	x	x	x	x	x	x	X
Mfuko			x	x	x	x	x	x	x	x	x	x	X
Ntekute											xxx		
Mbata	Duck	*Anatidae anatinae*	x	x	x	x	x	x	x	x	x	x	X
Nkumba			x	x	x	x	x	x	x	x	x	x	X
Mpombo			x	x	x	x	x	x	x	x	x	x	X
Kalulu	Rabbit	*Leporidae lepus*	x	x	x	x	x	x	x	x	x	x	X
Mpelembe			x	x	x	x	x	x	x	x	x	x	X
Fipele			x	x	x	x	x	x	x	x	x	x	X
Eggs			x	x	x	x	x	x	x	x	x	x	X

ANNEX 2: FOOD PREPARATION TABLES

ZONE 1: SIAVONGA

FOODSTUFF	**EATING METHOD**			**PREPARATION METHOD**
	RAW	**COOK**	**ROAST**	
STAPLES				
Grains				
Millet Zembwe), Maila (T), (N) *(T)* Lukesha (L) Luku (K), Amale (B) *Eleusine aflicana*		x		Millet is used to prepare the following foodstuffs. (i.e) Mumpela, Sample, Chibwantu and also for beer brewing. Mumpela Thresh the millet and then pound to remove the outer seed coats. Then grind the threshed millet using the grinding stone and in the process add a bit of water while continuing with the grinding until you form a thick paste called "Mumpela". Sample Thresh the millet and then pound to remove the outer seed coats. Put in the pot and add water. Boil the millet until cooked. Eat just like that.
2. VEGETABLES				
Pumpkin leaves Bobo (T) Mangambwa (L) Bishu (K) *Cucumeropsis edulis*		x		Remove the strings and cut finely. Wash then put in pot and cook for a short time. Throw away the first water and then add pounded groundnuts, tomatoes, salt and oil or pounded makowa seeds if available. Continue cooking until ready. Serve as relish
Mundioli (T) Cucumeropsis edulis		x		From the same pumpkins leaves you can also prepare "mundioli". Dry the pumpkins leaves over the fire and then pound them. Boil water and add salt. Then add the pounded mundioli, still to mix. Add only salt.
Okra *Mutezi (T)*		x		Wash and then put in the pot. Add salt, water, and " makungu" (soda) and cook until its ready. Serve with nshima.

FOODSTUFF	EATING METHOD			PREPARATION METHOD
	RAW	COOK	ROAST	
Cucumber leaves Makowa leaves (T) Amankolobwe, Chibimbi (B), Makowa (T) *Cucumis sativus*		x		These belong to the pumpkin family. Simply string off and cut finely. Prepare like the pumpkin leaves. Add dried pounded groundnuts or makowa seeds (pounded) or oil if available. Serve as relish.
Rape		x		Cut into small pieces, wash, then put in the pot and cook. Add oil or pounded groundednuts.
Cassava leaves Mwanja Katapa (B), Matamba (K) *Manihot esculenta*		x		Blanch the cassava in water for a few minutes. Discard the water and then pound the cassava leaves in a mortar. After that put in the pot and add making (soda) and cook until the water is finished .Add salt, tomatoes, onion, oil or groundnuts if available.
Debelebe		x		It is cooked like any other delele in the area. Pound the fresh leaves and put in the pot. Then add the ash to the water to make "Makungu" soda. Add some water and boil as lukomba. Put salt, tomatoes and serve as relish.
Bean leaves Manawa (L)[1] Chilemba (B) *Phaseolus lunatus*		x		Pluck the leaves from the stems. The leaves can be prepared fresh or dried. To prepare the fresh leaves simply wash them and put in the pot. Add and boil until cooked. Soda ash can also be added if desired. Pounded groundnuts or makowa seeds can also be added if available.
Cow Pea Leaves Chimpapila (B), Matuvu anyabo (T) *Vigna unguiculata*		x		These can be prepared as either fresh or dried just as the beans leaves Fresh leaves are picked and chopped. These are boiled in water for a short time with addition of ingredient s to taste.

[1] (All types of Beans and cowpeas)

FOODSTUFF	EATING METHOD			PREPARATION METHOD
	RAW	COOK	ROAST	
Mpoko Leaves from a tree		x		Chop the leaves once they have been picked..Put in the pot and boil for a short time. Over cooking makes them bitter. Pounded groundnuts or makowa seeds can be added if available. Add also some tomatoes and onions to taste.
Black Jack Hahipa (T), Kasokopyo (B) *Bidens pilosa*		x		The dried leaves are pounded and the cooked in water for a few minutes. Add pounded groundnuts or makowa seeds if available.
Okra Lunkomba, Mudelele (T) Mulembwe (B), Delele (N), Mudelele, Lunkomba (T) *Hibiscus esculentus*		x		Pound the leaves in the mortar and then put in the boiling water to which 'makungu" soda has been added. Cook on fire for a very short time while stirring continuosly. Add tomatoes and onions if available.
Mupulanga Leaves from a tree		x		Cut the leaves and add to the boiling water. Pound the dried groundnuts and add. Cook for a short time. If over cooked it becomes bitter.
Kafeyafeya/sialundu (T) *Cucumis spp*		x		Prepare as the pumpkin leaves.
Nhovwa	x			These are wild fruits picked from the bush and are eaten raw
Mutedze (Delele)		x		This is prepared by adding soda and salt including some tomato if available and boiled for some time till ready.
Suuna (Shungwa)		x		The leaves are plucked fresh and chopped I smaller pieces and cooked by boiling for 1 to 2 hours to remove bitterness. Oil or groundnuts can be added, with tomatoes and other ingredients. If these are absent ground cucumber seeds are instead added.
Mooko		x		Cooked as suunna

FOODSTUFF	EATING METHOD			PREPARATION METHOD
	RAW	COOK	ROAST	
Chimowa *Amarathas dubis*		x		Chopped leaves are cooked for 5 minutes and ingredients added to taste.
Mundyoli		x		Cooked like delele but special attention is given to leaves as they are first roasted for a short while on fire to improve flavour. It is then pounded and sieved with the product ready for use. Cooking is instant with simple addition of boiling water, making delele ready for eating.
Okra *Dereregoba.*		x		Leaves are collected and sun dried. They are then pounded and sieved till fine powder is obtained and used for Nshima or Sadza (G). This can eaten with fresh leaves of the same plant as relish (delele).
3. SEEDS				
Tsangu		x		Women collect pods of *acacia albida* from the forest. The pods are beaten to remove seed. A fire is set up to boil the seeds, first for one hour in clay pot. The seed skins are then removed by rubbing with hands and then washed in cold water to remain with a white inner coat. Further boiling for about 3 to 6 hours is done and soda (locally a juice filtered from ashes of wood) added to remove bitterness. When ready, the soda is removed and fresh water is added about six times for the rest of the cooking period. The final product is either consumed directly with little addition of maize meal or dried for storage.
Nsozwa		x		The procedure for processing is similar to tsangu except that soda is not added.
Mandepande		x		Prepared as tsangu
Nsiinyu		x		These are gathered from the bush, the skins are removed to obtain seed, which is pounded and sieved after which the flour is ready for cooking as Nshima.
Dzungu		x	x	Seeds are roasted and pounded into a pulp. This can be eaten with Nshima or added to vegetables such as Suuna.
4. MASHROOMS				

FOODSTUFF	EATING METHOD			PREPARATION METHOD
	RAW	COOK	ROAST	
5. LEGUMES				
Common beans		x		Legumes are always cooked with salt until tender and condiments (oil, tomato, onion, spices) can be added when available or desired
Cow peas		x		Legumes are always cooked with salt until tender and condiments (oil, tomato, onion, spices) can be added when available or desired
Green gram		x		Legumes are always cooked with salt until tender and condiments (oil, tomato, onion, spices) can be added when available or desired
6. FISH				
Inswi (fish)		x	x	Can be prepared either when fresh or dry. When fresh, open the belly to remove the intestines and then remove the scale .Put in the pot and cook ,add tomato onion and oil until it's cooked. Or you can dry the fresh fish and cook by boiling it. Add tomato, onion and oil
Kapenta.		x		This is usually bought from the market. It can be cooked by adding groundnuts or by frying it with oil.
7. INSECTS				
Caterpillars		x	x	Caterpillars are first squeezed to remove stomach contents, then boild with salt and dried and can be eaten. To prepare for eating can be fried with oil and spices
Termites		x	x	These are fried or cooked and salt added
8. ANIMAL PRODUCTS				
Nyama (meat)		x	X	When available you can simply roast or cut and put in the pot add water to boil until cooked. Add oil to fry
9. FRUITS				

Baobab Mabuyu (T), (B), Mlambe, Nkulukumba (N) *Adansonia digitata*	x	x		• They are fruits picked from the trees in the bush. To access the edible portion you simply have to break the outer hard shell. Inside there is a whitish edible portion with seeds in it. From the same mabuyu you can also make a drink by pounding the edible portion in the mortar. Seive to make some fine mabuyu flour and to this flour add water to make a drink. • The four can also be used to add to porridge
FOODSTUFF	**EATING METHOD**			**PREPARATION METHOD**
	RAW	**COOK**	**ROAST**	
10. MISCELLANOUS				
Chaama		X		It's a wild tuber which looks like sweet potatoes and usually dug from the bush.. When dug wash it and then cut to some sizeable pieces and put in the pot. Boil very hard for about 2-3 hoursand in the process adding about 3-4 times water. Serve only when cold. It intoxicates when eaten hot. It can be served with honey or tea.
Ndiya				A very highly poisonous wild tuber eaten only during the hard times as a means of survival. When dug from the soils, it is washed and then the bark is peeled off. Cut into small pieces like chips, and then soak in running water for overnight. After that just cook in one water only. It has a very flat taste, but salt is not added. When not properly prepared, it has a bitter taste and can be very poisonous.

Chibwantu		X		Thresh the millet and then soak in water for a few days until it shows signs of germinating. After that dry the millet and then pound to form the millet flour. Then prepare the porridge using millet flour prepared from the millet, which has not been soaked in the water. After the porridge has been prepared add the millet prepared from the germinated millet. Boil and leave to cool .let it ferment for a day or so to form chibwantu.
Lwiidi		X		These are wild tubers collected from the bush. Once picked they are washed and cooked for several hours.
FOODSTUFF	**EATING METHOD**			**PREPARATION METHOD**
	RAW	**COOK**	**ROAST**	
Mphunga		x		This is the popular lusitu grass. Several varieties were identified in the meeting. These include Maande referred as the real grass, zibebe, kapurepure and chikokakoka. The grass peaks in February. It is gathered from the bush with flat baskets that tied around the waist of the collector and a small stick long enough to cover its diameter is used to beat the heads over the collecting basket. The collected grain is sun dried for 2-3 days after which it is pounded and sieved to remove husks. A smooth stone is then used to grind the grains to flour and used to make insima. It was mentioned that the meal looks greyish but when cooked turns green. The ground meal is stored in clay pots, sacks and drums for several months.
Matausurwe		x		Cooked like beans (Nyemba)
Chakaka		X		Cooked as above

ZONE 2: MONGU

FOODSTUFF	EATING METHOD			PREPARATION METHOD
	RAW	COOK	ROAST	
2. STAPLES				
2.1. Tubers				
2.1.1. Cassava[2] tuber/ Tapioca [Tute, Kalundwe (B), Makamba (K), Mwanja (T), (N), (L) *Manihot esculenta*	Yes	Yes	Yes	-Peeled and eaten fresh (raw) or boiled, roasted and pounded groundnuts maybe added to boiled cassava. Pounded muzauli may be added in place of groundnuts. Tea or milk may be taken with the cooked cassava. -For Nshima may be soaked for 2-7 days (shorter period when warm than when cold) to ferment/wash out poisons, then peeled and pound before drying. Dry product is pounded into flour and sieved for cooking nshima. Nshima prepared by adding flour to boiling water in a pot and then stirring into nshima off the heat or fire. May be peeled then soaked for 4-5 days to ferment/wash out poison, then cut into chips, which are dried and later pounded into flour for nshima
2.1.2 Sweet Potatoes Chibwali (T), Tambankole (K), Ifyumbu, Kandolo (B), Kachamba (N), Ngulu (L) Ipomoea batatas	Yes	Yes	Yes	-Boiled whole or roasted whole. Maybe peeled then boiled. Roasted pounded groundnuts maybe added. Pounded muzauli may be added instead of groundnuts. May be eaten with tea or milk. -May be roasted in burning coals. -Preserved by peeling, chopping and then dried. May be blanched before drying. Cooked when required for eating. Pounded muzauli may be added. ----- Pounded groundnuts may be added and product consumed as relish.

[2] Considered as food for the low/poor people in society by some Lozi people. However acceptance of the staple is on the increase especially as an alternative when cereals are scarce.-bitter, hard or toxic varieties of cassava have been soaked for generations. Toxic varieties are known to cause headaches and dizziness.

FOODSTUFF	EATING METHOD			PREPARATION METHOD
	RAW	COOK	ROAST	
2.2 Grains				
2.2.1 Finger Millet Lukesha(L) Luku (K), Amale (B), Maila (T), (N) Eleusine aflicana	No	Yes	No	-Dry grain may be pounded/ground into flour/ mealie-meal for cooking nshima or porridge. -grinding stone may be used to produce flour since grains are difficult to pound.
2.2.2 Bulrush Millet Mauza (L) Luku (K), Amale (B), Maila (T), (N) Eleusine aflicana	No	Yes	No	-Dry grain may be pounded/ground into flour/ mealie-meal for cooking nshima or porridge. -For instant porridge (senga) water is boiled and bulrush millet flour added. The porridge is immediately ready to drink/eat. -a little water, sugar and salt may be added to the flour to make firm solid lumps which are boiled until cooked. The 'scones' (manyende) produced are consumed with tea, milk or maheu. -For making beer the dry grain is soaked in water for five days for it to sprout. The sprouts are then dried in the sun and later pounded. Maize meal and some bulrush millet flour are then mixed with water in a drum (kukondola). On day two the mixture is boiled and cooled and some dry malt added (kuumela). On day three four some dry malt is added to the boiled cooled mixture. On day four the beer is sieved and served. -For Maheu some porridge is made and sugar or malt added to the cooled porridge. The mixture is allowed to ferment overnight and then served.
(Maize)[3] Mbony i(L), Mataba (K),(B), Maila/Mapopwe (T), (N)] *Zea mays*	No	Yes	Yes	-Boiled or roasted fresh Fresh maize is crushed in a mortar and fermented to make the soaking water sour. Porridge is then made. Dry grain may be pounded/ground into flour/ mealie-meal for cooking nshima or porridge

[3] Very nutritious for breast feeding mothers. Nshima or porridge gives a longer lasting fill than that prepared from maize ground at the hammer mill.

FOODSTUFF	EATING METHOD			PREPARATION METHOD
	RAW	COOK	ROAST	
Maize cont.				Left overs from pounding mealie meal (grits) may be used to make porridge. Dry grain may be soaked in water for a few hours or a day then dried a bit. Bran comes off easily whn pounding. Flour used to make nshima. For maheu some porridge is made and sugar or malt added to the cooled porridge. The mixture is allowed to ferment overnight and then served. Dry grain may be boiled whole or made into samp boiled and eaten Dry grain may be soaked in water to soften it and then roasted over a pan (chiwaya)
2.2.4 Sorghum Mabele (L) Mabele (K), Amasaka (B) Sorghum lincolor	No	Yes	No	-Treated same as with bulrush millet
2.2.5 *Makwangala and Maona* (belong to water lily family)	No	Yes	No	Uproot, wash, boil remove coating which is blackish in colour. Inside is a pulpy egg yolk-like mass, whitish for makwangala and yellowish for maona. Makwangala may be prepared into flour by removing hard coat when wet, dried, pounded then flour made into nshima as for maize meal.
2.2.6 *Mashela*	No	Yes	No	- put fish in pot and put mashela on top.
2.2.6 Rice *Oryza sativa*	No	Yes	No	-Polished rice may be boiled and sugar, fresh milk sour milk, groundnuts or muzauli added. -Polished rice may be soaked in water, dried and then made into flour by pounding and sieving. Used to make Nshima - cooked like maize meal. -For Maheu malt and sugar are added to the cooled porridge and then left to ferment. -For scones (Manyende) rice is pounded continuously until flour is made. May or may not sieve. Grits are added later if sieved. The flour, with grits, is made into balls by adding a little water and kneading. -Partially dried rice may be pounded till paste is formed. Tastes like skim milk when cooked. Called kashamiliketi.

FOODSTUFF	EATING METHOD			PREPARATION METHOD
	RAW	COOK	ROAST	
2.2 VEGETABLES				
2.2.1Sindambi [4]	No	Yes	No	Boil dry leaves and groundnuts or cooking oil Add fresh or dry leaves to dry fish during boiling
2.2.2 Cassava leaves Shombo (L), Katapa (B), Matamba (K) *Manihot esculen*	No	Yes	No	-Pound boil for about 2 hours and add groundnuts or pounded muzauli. Soda may be added to quicken cooking process and to prevent colour change.
2.2.3 Sweet potato leaves) *Kandambwila (L)*	No	Yes	No	-Dry leaves a bit and then boil and add groundnuts or pumpkin seeds or mingongo.
Okra Mulembwe (B), Delele (N), Mudelele, Lunkomba (T) *Hibiscus esculentus*	No	Yes	No	-Chop fruit or leaves, boil in water to which soda has been added to make a slippery dish. Soda also prevents colour change. -Chop fruit and fry in oil
2.2.5Impwa(K), (B), (T), (L) *Solanum macrocarpon*	Yes	Yes	No	Eaten raw as snack Boil and add tomato vegetable oil or animal fat
Pumpkin leaves Mangambwa (L) Bishu (K) *Cucumeropsis edulis*	No	Yes	No	-Wash and peel fibres. Cook in very little water and add oil tomato or add groundnuts or muzauli instead of cooking oil.
2.2.7 Cat's whiskers *Sishungwa (L), Lubanga (B), Chishungwa, Kayuniyuni (T)* Cleome gynandra	No	Yes	No	Boil until cooked and then add groundnuts.
2.3 SEEDS				

[4] Eaten when other relish is not available

FOODSTUFF	EATING METHOD			PREPARATION METHOD
	RAW	COOK	ROAST	
2.4. MUSHROOMS				
2.4.1 Zondwe (L) Bowa (K), (B), (T), (N) Agancus campestris	No	Yes	Yes	-Wash and then break into small pieces with hands, or cut into chips and then fry in cooking oil. Add tomato if available or desired. -Pound to make minced zondwe. Add to meat dishes when cooking -Pound and boil, then add groundnuts Roast over open burning coals or inside coals, just like fresh maize and then eat as relish Boil and add tomato, onion, sindambi.
2.4.2. Mapuo	No	Yes	Yes	Boil then add sindambi or groundnuts. Roast in or on hot coals like meat.
2.4.3 Kashimbandala	No	Yes	No	Boil or fry. May add to offals or fish.
2.4.4 Ndwindwi	No	Yes	No	Boiled and then cooking oil, tomato added. May add dry mushroom to meat to thicken soup
2.4.5 Sichikwele	No	Yes	No	-Boil and then add oil
2.4.6 Lilangalasinde	No	Yes	Yes	Boil and add oil and tomato Roast Add partially dry mushroom to meat or fish to make very tasty dish.
2.4.6.Nakambama	No	Yes	No	Boil and add cooking oil. Add to fish or meat
2.4.7 Liluwe	No	Yes	No	-Fry, or boil and add cooking oil
2.4.8 Bushele	No	Yes	No	-As liluwe
2.4.9 Simambwe	No	Yes	Yes	-Roasted or fried. Toxic when boiled
2.4.10 Makana	No	Yes	No	-Boil and add cooking oil, tomato. -Add to other relishes
2.4.11 Silutoko	No	Yes	No	-As makana
2.4.12 Nakayeke	No	Yes	No	- as makana

FOODSTUFF	EATING METHOD			PREPARATION METHOD
	RAW	COOK	ROAST	
5. LEGUMES				
5.1 Bambara nuts) *Lituu (L)*	No	Yes	No	-Boil in shell and eat as snack after opening shell -Boil shelled nuts and crush to make a paste. Add cooking oil and tomato if available. Eat as a relish -To make sinkobole roast shelled nuts and pound together with roasted or boiled cassava or sweet potatoes.
5.2 Beans Manawa (L)[5] Chilemba (B) Phaseolus lunatus	No	Yes	Roast	Boil and add tomato, cooking oil. Roast and then pound to remove seed coat, boil and then add groundnuts Boil fresh in the pod and eat as snack
5.3 Groundnuts/Peanuts Ndongo (L) Mbalala (K), Imbalala (B) Nshaba (N), Ndongo (L), Nyemu, Ndongwe (T) *Arachis Hypogea*	Yes	Yes	Yes	Roast, boil with or without shell and eat as snack (for both fresh and dry) Pound raw or roasted shelled nuts for addition to other dishes to improve or vary flavour and taste.
6. FISH				
Fish [6]	No	Yes	Yes	-for fresh fish boil after removing scales and viscera, and add cooking oil and tomatoes when fish is cooked. -May fry fresh fish in oil or own fat or roast over hot coals. For dry fish, may roast over hot coals. The fish may be fried in oil after some soaking in water. vegetables, groundnuts, mungongo, litoze may be added to fish while it is boiling (especially dry fish)

[5] (All types of Beans and cowpeas)
[6] Women should not eat the head of fish as they can become big headed (proud).

FOODSTUFF	EATING METHOD			PREPARATION METHOD
	RAW	COOK	ROAST	
Fish cont.		X		litapi zakufutisa (rotten fish) is prepared by leaving fresh fish for 2 days to rot and then the viscera are removed and the opened up fish put out to dry. Cabbage may be added to nyengo fish (a bitter fish liked by the mbunda) Dry fish may be pounded and cooked with pounded groundnuts.
7. INSECTS				
8. ANIMALS PRODUCTS				
8.1 Fresh milk *Muzilili (L)*	Yes	Yes	No	-Boil and drink. May be added to nshima, rice, porridge, cassava.
8.2 Sour Milk *Mabisi (L)*	Yes	No	No	-Fermented by placing fresh milk in calabash overnight and then removing whey and pouring more fresh milk for 3-4 days repeatedly. Whey is given to dogs, used to make porridge or used to ferment fresh milk. -Eat sour milk with nshima, cassava, porridge, samp, cooked sorghum grains, sweet potatoes.
8.3 Eggs Mai (L)	No	Yes	No	Boil in water, remove shell and eat. Pour into tomato and cooking oil soup and cook, stirring. Break shell and put egg in cup. Add a little oil and place cup in boiling water until egg is cooked. Cool and cut solid egg mass into pieces and eat. Fry eggs in oil in pan
8.4 Water monitor[7] *Hopane (L)*	No	Yes	No	-When trapped kill and cut head off. Remove tail and nails and viscera. Put fat aside then boil in water and salt to taste. Boil the whole day so that bones can be removed from flesh. Melt fat and add. Fry until golden brown.
8.5 Turtle	No	Yes	No	Boil in water to kill and soften then remove shell, head and nails. The meat is cut and cooked. May fry in cooking oil or turtle's own fat.

[7] bones are removed and buried. If one so much as bites into a bone, it is believed that they will die.

FOODSTUFF	EATING METHOD			PREPARATION METHOD
	RAW	COOK	ROAST	
9. FRUITS				
9.1 Mango	Yes	Yes	No	Eaten raw when ripe or partially ripe. Partially ripe mangoes may be peeled and seed removed. The flesh is boiled and maize meal added. The mixture continues to boil until the maize meal is cooked. Ripe mango is pounded to a mash. Water is added to make thinner mango juice that can be sieved. The sieved liquid is used to make porridge. Peeling partially ripe mango and making thin slices of the flesh prepare mango relish. The slices are fried in hot oil until crisp brown. Salt is then added and the chips are eaten with nshima. To make beer overripe mangoes are placed in a drum for 3-4 days. The drum contents are then distilled to make a very intoxicating beverage. The distillation is by placing the sealed drum over a fire leaving only a pipe for the distillate to pass through. Part of the pipe is passed through a coldwater container to allow for condensation of the distillate. To test the strength of the brew a small quantity of the distillate is poured onto a fire. A strong brew will cause a burst of flames. Mango may be boiled with the skin and eaten.
9.2 Pumpkin *Namundalangwe (L)*	No	Yes	No	Peel, chop, boil and when cooked add mealie meal to make porridge. Pound seeds when dry and add to vegetables like pumpkin leaves, cassava leaves Chop fresh pumpkin, boil and cook. Not a much favored method of preparation Preserved by making rhin slices of the flesh and then these are dried. They are cooked when required for consumption.
9.2 *Mubula*	Yes	Yes	No	Peel fruit and eat. Ripe fruit is pounded slightly, mixed with a little water and when the solid settles remove the liquid and drink. Mubula liquid from pounding may be used to make beer (fermentation and distillation) Mubula seed is cracked open with an axe, stone or heavy stick to remove the nut. Nuts may be eaten or pounded for addition to relish.

FOODSTUFF	EATING METHOD			PREPARATION METHOD
	RAW	COOK	ROAST	
Mungongo	Yes	Yes	No	-Mungongo seed is cracked open with an axe, stone or heavy stick to remove the nut. Nuts may be eaten or pounded for addition to relish.
Muzauli	Yes	Yes	No	clean and soak in water to soften. Seeda separate from covers when softened. Muzauli seed covers are mixed with roasted or boiled cassava or sweet potatoes and pounded together. Muzauli seed covers may be pounded into paste for addition to relishes. Muzauli seed covers may be boiled until oil collects at the top of the hot liquid. The oil is skimmed off. Ensure all water is removed by boiling the oil so that it keeps longer.
Mukuwa	Yes	Yes	No	-Soak to soften the seed covers and remove the covers by pounding in some water. Remove the liquid, leaving the seeds. The liquid may be added to cooked sweet potatoes or cassava.
Munyelenyele	No	Yes	No	Ripe fruit is put in large container (shomeka) and boiled in water. Maize stalks with roots working like forks are used to crush the flesh. When the nuts become whitish in appearance oil starts to collect at the top of the boiling liquid. The container is removed from the fire and cold water poured to make the oil come up to the surface. The collected oil is removed as slabs of fat. The seed is eaten by children
Muhuluhulu	Yes	Yes		-When ripe crack shell and eat. May make beer by fermentation and distillation of fruit.
Cashew nut	Yes	Yes	No	-Eat the flesh raw or make beer by fermentation and distillation method. -Nuts may be pounded and added to relish
Mumosomoso and munbole	Yes	Yes	No	-Eaten raw or ade into beer by fermentation and distillation. -Preserved by Blanching and dried.
Mahwahwa	Yes	Yes	No	-Cracked open and eaten a snack. Pound the fruit and add a little water for better extraction of the sweet liquid. Liquid is separated by sieving and then boiled and drank. -Shells may be used as spoons.
Muhamani	Yes	No	No	-Peel and eat raw.

FOODSTUFF	EATING METHOD			PREPARATION METHOD
	RAW	COOK	ROAST	
Muhamani cont.				-Peel and soak in fresh milk. Drink after thorough mixing.
Mambongo, munjongolo, mumawa	Yes	Yes	No	Eaten raw. Make beer by fermentation and distillation.

ZONE 3: KASAMA

FOODSTUFF	CONSUMPTION				PREPARATION METHOD
	RAW	COOK	ROAST	OTHER	
1. STAPLES					
Tute (cassava)					The tute is dug peeled and soaked for 2 to 3 days in water in. In June it takes even 1 week as the water is cold. It is removed from water and pounded Then it is spread on a reed mat but preferably of a stone surface where it easily dries. When dry, it pounded further to make cassava meal. It is sieved and large particles are again pounded 4 methods using cassava tree A. Katapa; leaves are consumed very soft leaves from the lateral buds are pruned and pounded. Hard leaves are very bitter ad can not be taken even when pounded Pounding helps to soften the katapa, unpounded leaves can not be cooked. Soda is used whilst cooking to further soften the relish. Roots (kalundwe) is processed into meal Kalundwe that is not bitter (tasteless) is cooked fresh and consumed e.g for breakfast Soft kalundwe can be roasted and eaten together with roasted groundouts. *Ukukokota*: peeling unbitter cassava and chewing if without cooking. *Kachekele*: a kind of brew that is very alcoholic made from peels of tute(further details could not be given and the meaning that the brew could really be alcoholic and fatal). Used to make '*imubuli'*. Fresh cassava is dug washed and peeled. Then cut into pieces and cooked. Add salt and can be served with tea. Also without cooking when peeled it can be eaten raw. Fresh cassava is washed, peeled and then soaked in water. Dry it. When fully dry can be roasted with salt or rather pound it into cassava meal.

FOODSTUFF	CONSUMPTION				PREPARATION METHOD
	RAW	COOK	ROAST	OTHER	
Maize		x			Used for making porridge can be obtained from the field whilst fresh then boiled to cook ad an anytime meal Making samp. For making munkoyo, beer and nshima Fresh Maize porridge. The fresh maize is peeled using a knife. You then pound the skinned maize in a mortar. Then you add water and sieve. Use the sieved water to prepare the porridge. Maize Fritters: Mix fine mealie meal with water. Mould into round balls and fry.
Amale (millet)		x			Seeds are ground to make flour which is used to prepare “ubwali” and “munkoyo”
Amasaka (sorghum)		x			Milled to make flour for preparing nshima Just cooked as sample like rice and also you can add groundnuts
Ifyumbu Sweet potato		x			When dug are washed, peeled and eaten raw. Also be peeled then cut into pieces that are then fried in cooking oil to make fritters. *Nsemwa:* Can be peeled, cut into pieces, cooked and dried. Children can be picking pieces and eat anytime they feel like. Semwa can be reboiled and groundnuts addes to it. Serve. Peel the potato, cut into small pieces and then boil with water. Peal, wash, then cut into small pieces and boil. Then add fried pounded groundnuts and serve.
Irish potatoes		x			Once dug, wash them and peel. Put in the pot and boil to cook. Add tomato, onion and cooking oil. Can be served with meat. Making Chips
Banana	x	x			Get green bananas, remove the covers, cut the bananas into desired pieces, boil until cooked. Add onion, tomato, spices etc if desired. Serve with meat, bean or any relish preferred.

FOODSTUFF	**CONSUMPTION**				**PREPARATION METHOD**
	RAW	**COOK**	**ROAST**	**OTHER**	
2. RELISHES					
Chilemba (BEANS)		Yes			Wash the beans. Put in the pot, add water and boil until soft. If available, add oil tomato, onion and any favorite spices. Serve with nshima. *Chitubika*: boil beans for about five minutes, remove from the fire and leave to cool. Remove the covers from beans, put in the pot and cook again until soft. Mash the bean until porridge like paste (sieve to get a smooth paste). Put tomato and oil if available. Serve with nshima or rice. Fry and pound groundouts. Make paste sieve the paste to get a smooth paste. Add to the cooked beans, add tomato if available. Cook beans. Add okra when about to cook, serve with nshima. Bean and okra can be cooked separately and then add them together when they are cooked
Sunflower	x		x		Fried sunflower: Remove the black covers and fry the remaining parts and serve. Pound the sunflower, put it in the pot and leave it boiling for sometime. Oil comes on top, remove oil settling on top with a spoon. Heat the oil in another pot until all water evaporates. Use the oil for cooking or add to baby's porridge. The sunflower seed is cleaned and taken to a machine for expressing oil. Added to relish: The husks are removed. The inner parts are then mixed with water to make it lighter and is then added to the relish.
Mulembwe (okra)		x			Make *fishikisa*[8] (or can use soda). Pound the okra together with tomato. Add the liquid (fishikisa) while pounding/mixing with the okra. Put in the pot and leave it to boil until cooked. Serve with nshima. The leaves are plucked and pounded togethe with tomato and ash or soda. Put he mixture into the pot and cook. Some mulembwe such as bameya is simply cut with a knife and cooked in ash or soda water. Can also be cut, dried and pounded then cooked with groundnuts.
Pupwe		X			The leaves are dried, pounded and sieved. Get soda or ash water and boil with

[8] This is soda water made by adding as to water, left to settle and then sieved to make soda water.

					tomato(if available). The remove from fire/heat and add the fine pupwe powder to
FOODSTUFF	**CONSUMPTION**				**PREPARATION METHOD**
	RAW	**COOK**	**ROAST**	**OTHER**	
Pupwe cont.					the pot and stir. The mulembwe does not have to be put back on the fire
Bowa Mushrooms		x			Wash the mushrooms. Put in the pot and on fire, cook until soft. Wash, cook mushroom. Pound and add groundnuts. Tomato, spice and onion can be added if available. Bungusa mushroom: wash, pound and put the mushroom in the pot and add soda. Cook as required. Soda is required to change colour from white to cremish or light brown. *Poisonous mushrooms (Kapinda busefwe, Lutanga):* When these mushrooms are obtained from the bush , they are first boiled for short while (about 5 minutes) in water to which ash water or soda has been added. Then it is drained and dried. When cooking the dried mushrooms, it is boiled and then washed in the same water hot water. The water is then allowed to settle and the topmost water is used for boiling the mushroom (this is meant to retain the taste). Pounded groundnuts can then be added. This is also done to unknown mushrooms for fear of poisoning.
Bondwe		x			Once picked from the fields, can be washed, put in the pot then boil to cook. Add tomato, onion and cooking oil if available. It can be mixed with Lubanga and Chimpapila
Fishimu		x			These are obtained from the trees and then sqeezed to remove the faeces and then washed and boiled in ash or soda water. They are then ready to eat as relish. Soda is a precautionary measure for poisonous mushrooms and caterpiller e.g mitobo/fitobo.
Mponso		x			Wash fresh mposo, boil and add to okra. Wash the dry mposo, boil for a few minutes. Remove from fire and leave to cool. Remove covers from mposo. Cook again like beans.
Inswa (termites)		x			Wash, dry and fry. Serve with nshima or eat as a snack.
Nshinge		x			As inswa

Tekute					As inswa
FOODSTUFF	**CONSUMPTION**				**PREPARATION METHOD**
	RAW	**COOK**	**ROAST**	**OTHER**	
Banana	x	x			Remove from the tree and keep until it is ripe. Serve Get green bananas, remove the covers, cut the bananas into desired pieces, boil until cooked. Add onion, tomato, spices etc if desired. Serve. Cook bananas and add groundnuts.
Katapa		x			Remove sticks/stems. Pound the leaves, boil them for a long time to remove poison, add tomato if available. Pound the leaves, boil with fisikisa to reduce the poison, add groundnuts and serve with nshima.
Nsululu		x			Remove the stems, put the leaves in boiling water and leave to boil for along time to remove the bitterness. Remove from fire and leave to cool. Wash the leaves in different water and cool. Add groundnuts, tomato etc.
Impwa	x	x			When picked from the fields, you wash them and cut into halves, then put in the pot. Boil until cooked and add oil, tomato and onion. Whole Impwa: Wash, put them in the pot and boil until almost ready. Then peel off the skin, add cooking oil, tomato or pounded groundnuts then cook until ready. They can also be added to chimpapila, katapa or any other vegetables.
Amankolobwe		x			Fresh ones are put in the pot and add water. Cover the pot and cook until the water dries up. For dry amankolobwe, you cook by adding soda and groundnuts (pounded) they can also be added to fish.
Makangala		x			Prepared as amankolobwe above.
Chimpapila		X			Fresh ones: Remove stems, and put in a pot. Add salt and boil to cook. Add tomato or onion or groundnuts if available. Add impwa.
Kacheshya		x			Wash leaves and put them in the pot. Add soda and cook. Remove the water, wash it

					again and put in another pot, add the pounded groundnuts and cook again until ready.
FOODSTUFF	**CONSUMPTION**				**PREPARATION METHOD**
	RAW	**COOK**	**ROAST**	**OTHER**	
Kacheshya cont.					*The reason of changing water is to soften it because it becomes hard when cooked in the same water.*
Soya beans fritters		x	x		The beans is fried and eaten whole. Made into *milk*. The beans is boiled fir about an hour and then the musks are removed. It is then pounded and soaked in water. The water is filtered and the residue pounded and soaked in water, filtered several times. The filtrate (white soya water) is boiled and then used as milk. *Coffee*: The soyabean are fried to adeep brown colour , then cooled and pounded in mortor. After seiving the ground beans powder can be used. *Porriadge:* The soyabeans is put boiling water to remove the smell. It is boiled for a short while and the reomoved from the fire. The husks are then removed and the seeds pounded after drying. Boil the soya beans and then pound them gently to make a very fine powder and dry a bit in the sun but not to over dry. Mould into small balls and try to make flitters. You can add an egg if available.
Imbalala	x	x	x		The fresh ones are dug from the soil. Washed, put in the pot and boil to cook. Eaten raw as a snack. Can be dried in shells, when dry the shells are removed and the groundnuts can be roasted, add salt and serve as relish or just eating. Can also be pounded into fine powder to add to some other vegetables and foods in the absence of cooking oil. Cooking oil can also be extracted from groundnuts.
Intoyo		x			Can be cooked when it is still fresh Eaten raw as well. When dry it can also be cooked. Add groundnuts and serve as relish.

FOODSTUFF	**CONSUMPTION**				**PREPARATION METHOD**
	RAW	**COOK**	**ROAST**	**OTHER**	
Ilanda		x			These are like beans. Can be cooked when still fresh or when dry. Groundnuts can be added and served as relish. *Katubika:* as for beans.
Tongwe		x			Prepared like ilanda above.
Chikanda.		x			First make concentrated ash water. Chikanda root/orchids are washed and dried; then it is pounded. Groundnuts are pounded also. The ash water is boiled and then groundnuts and salt is added. While the mixture is boiling, the chikanda powder is added with thorou mixing until it is hard. It is then covered with a lid and some burning charcoal is placed on the lid and little fire on the bottom of the pot. After simmering it is ready for eating with nshima. It can also be cut into small pieces and then fried with tomato and onion; or you can cut it into smaller pieces and add groundnuts and simmer it and use it as relish.
Inyense		x			Once dug from the ground, remove the skin and cut them open to remove the intestines. Wash them, put in the pot, add salt then cook until the water dries up. No soup is required.
Kapanga		x	x		When have been caught and killed, exposes to fire so as to burn off all the hair. Use a knife to scrap off all the remaining hair. Cut them open, remove the intestines and Wash. Then put them in the pot and cook on fire until all water dries up. Serve as relish. Soup not required.
Infuko		x	x		Prepared in the same way as kapanga
Insenshi		x			When killed, it is dressed as the chicken is done in hot water removing the feathers. Cut open and remove the intestines. It is prepared in the same way as chicken.
Insengele		x	x		Prepared in the same way as kapanga and a kalulu
Impelembe		x	x		Prepared in the same way as cows
Impombo		x	x		Prepared in the same way as goats.

Kalulu					Prepared in the same way as insenshi
FOODSTUFF	**CONSUMPTION**				**PREPARATION METHOD**
	RAW	**COOK**	**ROAST**	**OTHER**	
Fruits					
Mpundu	x				These are eaten as fruits They can also be used to make porridge. Pound them and sieve to fine powder. Use the powder to prepare the porridge.

SUMMARY TABLE OF METHODS OF FOOD CONSUMPTION, PREPARATION AND PROCESSING

FOODSTUFF	METHODS					
	CONSUMPTION				PREPARATION	CULTURAL FACTORS
	RAW	COOK	ROAST	OTHER		
1. STAPLES						
Luku (Finger Millet)	No	Yes	No		-Dry grain may be pounded/ground into flour/ mealie-meal for cooking nshima or porridge	
Maachipa (Gourds)	No	Yes	No		-Boiled till tender and cooked	
Makamba (Cassava)	No	Yes	No		-Peeled and eaten fresh (raw) or boiled or roast. Roast pounded groundnuts maybe added to boiled cassava -For Nshima may be soaked for 4-5 days to ferment/wash out poisons, then peeled and pound before drying. Dry product is pounded int flour for cooking nshima. -May be peled then soaked for 4-5 days to ferment/wash out poison, then cut into chips, which are dried and later pounded into flour for nshima	Considered as food for the low/poor people in society by some Kaonde people. However acceptance of the staple is on the increase especially as an alternative when cereals are scarce, as in the middle of the rainy season.
Mataba (Maize)	No	Yes	Yes		-Boiled or roasted fresh -Dry grain may be pounded/ground into flour/ mealie-meal for cooking nshima or porridge	
Mebele (Sorghum)	No	Yes	No		-dry grain may be pounded/ground into flour/ mealie-meal for cooking nshima or porridge	
Mwungu (Pumpkins)	No	Yes	No			

FOODSTUFF	METHODS					
	CONSUMPTION				PREPARATION	CULTURAL FACTORS
	RAW	COOK	ROAST	OTHER		
Tambampwanyi (Irish Potatoes)	No	Yes	No		-peeled and boiled with a little salt and then a little cooking oil or sugar may be added. -Peeled and cut into chips which are fried in cooking oil.	
Tambankole (Sweet Potatoes)	Yes	Yes	No		-Boiled whole or roasted whole. Maybe peeled then boiled. Roasted pounded groundnuts maybe added.	

FOODSTUFF	METHODS					
	CONSUMPTION				PREPARATION	CUTRURAL FACTORS
	RAW	COOK	ROAST	OTHER		
2. VEGETABLES						
I. Local						
Bishu (pumpkin leaves)	No	Yes	Yes		-Fresh leaves boiled for few minutes then cooking oil and tomato may be added. -Dry leaves may be boiled for one to 2 hours the cooking oil and tomato may be added. -Pounded groundnuts may be added to both fresh and dry leaves instead	
Bisonga	No	Yes	no		-Boiled in water. Pounded groundnuts may be added	
Bwengo (sesame seeds)	No	Yes	Yes		-Roasted and pounded to make paste (like peanut butter)	
Kalembula (sweet potato	No	Yes	Yes		-Most preferred in cooking in oil and	

FOODSTUFF	METHODS					
	CONSUMPTION				PREPARATION	CUTRURAL FACTORS
	RAW	COOK	ROAST	OTHER		
Sweet potatoe leaves cont.					tomato - May be boiled in a little water	
Katolo (lumanda)	No	Yes	Yes		-Boiled in water. Pounded groundnuts may be added. The vegetable has a slippery texture when cooked.	Considered as a vegetable for women by the Kaondes.
Matamba (Cassava Leaves)	No	Yes	Yes		-leaves are pounded and boiled for about 2 hours to destroy poisons and then cooking oil and tomato may be added instead of cooking oil	
Mpwa	No	Yes	Yes		-Cut in half, quarter or slices and boiled for a few minutes before cooking oil and tomato are added. -Dry Mpwa boiled for 1-2 hours before pounded groundnuts are added	
Mulembwe/Kiswita	No	Yes	Yes		-Cooked in water with soda or ash until leaves start to break into small pieces, making a slippery dish.	
Musabi	No	Yes	Yes			
Musebo	No	Yes	Yes		-Fresh leave's boiled for a few minutes then extra water removed to remove some bitterness. The leaves are cooked further and then cooking oil and tomato may be added -Dry leaves are boil for 1-2 hours before tomato oil or pounded groundnuts are added	

FOODSTUFF	METHODS					
	CONSUMPTION				PREPARATION	CUTRURAL FACTORS
	RAW	COOK	ROAST	OTHER		
Ndindingoma	No	Yes	Yes		-Cooked in water with soda or ash until leaves start to break into small pieces making a slippery dish.	
Pupwe	No	Yes	Yes		-Dry leaves are pounded and then sieved to obtain a fine powder, which is added to warm water containing soda or ash. Th mixture is then cooked for 5 minutes.	
Sampu (Bean Leaves)	No	Yes	Yes		-Fresh leaves boiled for a few minutes then cooking oil and tomato may be added. -Dry leaves may be boiled for one to 2 hours the cooking oil and tomato may be added. -Pounded groundnuts may be added to both fresh and dry leaves instead of cooking oil	
3. LEGUMES						
Lwanda (Cowpeas)	No	Yes	No		-Boiled till they are tender. Onion and tomato and cookng oil salat may be added if avaliable	
Mbalala (Groundnuts)	No	Yes	Yes		-May be boiled or roasted fresh in the shell -Fresh or dry nuts may be shelled the roasted -Dry nuts are pounded and sieved for addition to vegetables, dry meat and other relishes	

FOODSTUFF	METHODS					
	CONSUMPTION				PREPARATION	CUTRURAL FACTORS
	RAW	COOK	ROAST	OTHER		
Nkunde (Beans)	No	Yes	No		-Boiled till they are tender. Onion and tomato and cookng oil salat may be added if avaliable -Boiled till the seed coat is removable. After removing the seed coat the beans are cooked further until they make a porridge called kasengu.	

FOODSTUFF	METHODS					
	CONSUMPTION				PREPARATION	CUTRURAL FACTORS
	RAW	COOK	ROAST	OTHER		
4. FRUITS						
I. Local						
Bukufuti	Yes	No	No			
Imfungo	Yes	No	No			
Insafwa (Amasafwa)	Yes	No	No			
Kinanashi (Pineapple)	Yes	No	No			
Mabungo	Yes	No	No			
Makole	Yes	No	No			
Makonkola	Yes	No	No			
Makusu (Masuku)	Yes	No	No			
Malubeni (Mulberry)	Yes	No	No			
Mankulwiba	Yes	No	No			
Miindo	Yes	No	No			

FOODSTUFF	METHODS					
	CONSUMPTION				PREPARATION	CUTRURAL FACTORS
	RAW	COOK	ROAST	OTHER		
Mikuyu	Yes	No	No			
Mpaawa	Yes	No	No			
Mpundu	Yes	No	No			
Musole	Yes	No	No			
Mwenge	Yes	No	No			
Nkofwa	Yes	No	No			
Nkolobondo	Yes	No	No			
Nkulupya	Yes	No	No			
Nkurukufwa	Yes	No	No			
Nshimayaruko	Yes	No	No			
Nsokolela (Nsokolobe)	Yes	No	No			
Nsombojojo	Yes	No	No			
Nsungulu	Yes	No	No			
Ntungulu	Yes	No	No			
Tusongole/Tupwi	Yes	No	No			
Ii. Exotic						
Bimbi (Cucumber)	Yes	No	No			
Mango	Yes	No	No			
Mapela (Guava)	Yes	No	No			
Orange	Yes	No	No			
Matemate (tomato)	Yes	Yes	Yes			

FOODSTUFF	METHODS					
	CONSUMPTION				PREPARATION	CULTURAL FACTORS
	RAW	COOK	ROAST	OTHER		
5. MUSHROOMS						
Bunsununu	No	Yes	No		-Fresh mushrooms are boiled in water. Soda or ash may be added to water. Pounded groundnuts may be added when mushrooms are tender and cooked -Fresh mushrooms may be pounded before cooking -Dry mushrooms boiled in water for 1- 3hours or until then pounded groundnuts may be added	
Busangwa	No	Yes	No			
Busepa	No	Yes	No			
Chipampe	No	Yes	No			
Kaajanshona	No	Yes	No			
Kachilechile (Chitondo)	No	Yes	No			
Kalela	No	Yes	No			
Kamanse (Kabansa)	No	Yes	No			
Kankolekole	No	Yes	No			
Kamena Makanka	No	Yes	No			
Kaponso	No	Yes	No			
Kasukwa	No	Yes	No			
Katoto	No	Yes	No			
Kiiyinka	No	Yes	No			
Kisense	No	Yes	No			
Mampukutu	No	Yes	No			
Munya	No	Yes	No			
Musefwe (Busefwe)	No	Yes	No			
Ndelema (Tente)	No	Yes	No			
Nkulumbwe	No	Yes	No			
Nyiime	No	Yes	No			
Shinkula	No	Yes	No			
Tande	No	Yes	No			
Tanga	No	Yes	No			

5. MEAT	CONSUMPTION				PREPARATION	CULTURAL FACTORS
	RAW	COOK	ROAST	OTHER		
I. Domestic						
Nzolo (chickens)	No	Yes	Yes			Eaten only on special occasions such as ceremonies, celebrations or to honor guests.
Kibata (Duck)	No	Yes	Yes			
Mpushi	No	Yes	Yes			
Bangalamwe (Pigeons)	No	Yes	Yes			
Makanka (Guinea Fowl)	No	Yes	Yes			
Ii. Wild						
Baapuku (field mice)	No	Yes	Yes		Hairs are removed over an open fire and then the field mice are boiled before drying on racks. Some tomato and onion soup may be prepared as accompaniment for eating nshima	
Lukumbi (rodents)	No	Yes	Yes		As for baapuku.	
Luyeye (rodents)	No	Yes	Yes		As for baapuku.	
Mpongo (rodents)	No	Yes	Yes		As for baapuku.	
Nfuko (rodents)	No	Yes	Yes		As for baapuku.	
Iii. Insects						
Binkubala (Caterpillars)	No	Yes	Yes			
Maluko	No	Yes	Yes			
Nswa (Termites)	No	Yes	Yes			
Nyenze (Crickets)	No	Yes	Yes			

FOODSTUFF	CONSUMPTION				PREPARATION	CULTURAL FACTORS
	RAW	COOK	ROAST	OTHER		
Shonkonono (grasshoppers)	No	Yes	Yes			
Tukooto	No	Yes	Yes			
Tunkubi	No	Yes	Yes		-Boiled for 1 hour or until tender then mixed with tomato, onion and cooking oil	
Iv. Riverine						
Baankala (Crabs)	No	Yes	Yes		-Boiled for a while and then cooking oil onion and tomato may be added	
Bitonyo	No	Yes	Yes			
Kaaleya	No	Yes	Yes			
Kasepa	No	Yes	Yes			
Kiseense	No	Yes	Yes			
Kitoyo	No	Yes	Yes			
Milombe	No	Yes	Yes		-Boiled until flesh is cooked then oil, onion and tomato may be added	
V. Beverages						
Munkoyo	No	Yes	No		-Crushed munkoyo roots aree put in porridge cooked from maize, sorghum, or finger millet. The roots soak overnight and the munkoyo brew is allowed to ferment to varying levels of sour taste. -The munkoyo roots are available in the sorrounding forests.	
Kasange (beer)	No	Yes	No		-Maize grain is allowed to sprout for about five days until the sprouts are five centimeters long	

FOODSTUFF	CONSUMPTION				PREPARATION	CULTURAL FACTORS
	RAW	COOK	ROAST	OTHER		
Kasange cont.					. The sprouts are then dried and taken to the grrinding meal to produce flour. The flour is used to make some porridge, which is left to ferment in a container.	
Seven days (beer)	No	Yes	No		-Flour made from sorghum sprouts is added to maize porridge. After a day, the mixture is boiled and cooled and then put in a calabash or any othr container for further fementation for another day. The boiling, cooling and oneday fermentation are repeated for six days and the brew is ready for drinking on the seventh day.	

MISSION STATEMENT:

To provide leadership on food and nutrition matters in order to achieve an optimal nutritional status of the people of Zambia and contribute to the attainment of a healthy and productive nation.

VISION:

To achieve optimal food and nutrition status for the Zambian population

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