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Food systems description – Kitwe

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The project argues that important contributions to debates on urbanization in sub-
Saharan Africa, the nature of urban poverty, and the relationship between
governance, poverty and the spatial characteristics of cities and towns in the
region can be made through a focus on urban food systems and the dynamics of
urban food poverty. There is a knowledge gap regarding secondary cities, their
characteristics and governance, and yet these are important sites of urbanization
in Africa. This project therefore focuses on secondary cities in three countries:
Kisumu, Kenya; Kitwe, Zambia; and Epworth, Zimbabwe.

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INTRODUCTION
This report is based on the fieldwork undertaken in Kitwe in June 2016. The report will feed into the overall study that aims at exploring food systems in secondary cities and determine how these food systems function.

Specifically the overall study aims:

- To understand how their major configurations (formal vs. informal) differ in terms of environmental and social externalities;
- To identify the stages within the food systems with significant environmental and social impacts (also referred to as hotspots), and thereby suggest concerns that should be addressed in food systems governance.
- To describe the environmental and social externalities along the food supply chain for each case study city and where possible quantity these externalities.

To achieve the aim of the study, fieldwork was undertaken to observe and highlight issues along the food value chain of key food items. This was supplemented by published literature.

The food system is Kitwe is made up of diverse stakeholders from the formal and informal sectors. Food production (agricultural, aquaculture & fisheries, livestock) is done at commercial and small-scale levels. Wholesaling and retail is done through urban markets, supermarkets, kiosks and street vendors. Consumption happens at different platforms as consumers have access to a diverse range of foods through various retail and catering outlets such as hotels, restaurants, canteens and street food. A simplified version of the food chain is shown in the Figure 1 below:
Figure 1: Overview of the agricultural and food value chain in Kitwe
METHODS AND MATERIALS

This report is based on the fieldwork conducted in Kitwe analyzing the flow of food within the markets. The information presented in this report is based on published literature, filed observations and informal interviews and discussions conducted with selected stakeholders. The different research methods and techniques used in carrying out the study are discussed below.

Literature review

A desktop study was undertaken to ascertain food production and consumption patterns in Kitwe as well as to understand the food value chains of specific food items. This entailed a literature search for academic journal articles, scientific literature, government publications and research outputs from various institutions operating in the field of agricultural production and consumption. There is little information on agricultural value chains in Kitwe and as such the literature review focused on the regional movement of these foodstuffs in Zambia in general. This information provided a basis of understanding the food value chains and market systems in Kitwe.

Focus group discussion

A focus group discussion was held with research partners and key stakeholders that were invited to the inception meeting held in Kitwe before the fieldwork commenced. During the discussion, stakeholders advised on the markets to be visited that and the preliminary items to be tracked were discussed. Information was obtained about the key food items that are consumed in Kitwe. As a result of this discussion, some food items that had not be on the preliminary list were included in the research. The discussion also helped to identify the different institutions that we could engage during the project. As some of the stakeholders were from the Kitwe City Council and the marketers association, the discussion also facilitated the permissions required to conduct the research.
**Participant fieldwork observations**

Information was collected through direct observation of various activities at the landing sites, markets and retail spots visited. The fieldwork was undertaken over a couple of days in each of the Consuming Urban Poverty cities. It was not possible to cover all the markets within each city. However, the researcher selected the most relevant markets based on information provided by the partners in each specific city. During the visit, the researcher also went to government offices and various research and training institutes and reviewed various statistical records and other documentary material that could be obtained.

**Informal interviews and discussions**

Informal interviews and discussions were held with traders, market leaders, municipal officials, caterers and residents during the fieldwork. The interviews were conducted at *in situ* in the markets or on the streets. The informal interviews started with a general introduction of the researchers and a brief overview of the project and the objectives of the work being undertaken. Once the participant had agreed to answer the questions, the researchers engaged them on their produce to ascertain where the food stuffs were coming from and how it had been prepared. In the markets, the marketers continued working and selling their produce during the interviews. Some of the traders refused to speak to the researchers and or demanded to be paid. In those particular cases, the researchers thanked the traders for their time and expalined that no payments could be made. Interviews were conducted in a mix of english and the local languages. The researcher from Copperbelt University acted as a interpreter with participants who were not fluent in English. The interviews were not recorded but the researchers took down notes during each interview and permission was obtained to take photographs of the produce.
Kitwe markets

There are a number retail types in Kitwe, ranging from roadside traders to formal markets that are managed by the Kitwe City Council, as well as large formal retailers. The markets range in size from the small township markets to Chisokone Market that serves as a regional market. Some of the markets are planned markets and are managed by the city council while others are just spontaneous markets that arise in residential areas and or in high traffic areas. In most marketplaces, the vendors have an allocated space, stand or stall for trading. Levies are payable to the city council in municipal markets. In the townships, there are community markets, as well as numerous stalls that are locally called ‘tuntemba’. There is also a lot of street vendors and street hawkers in Kitwe. There are different types of street vendors and these include fixed kiosks, mobile stands, mobile vehicles (i.e. carts, bicycles, trucks, etc), street stalls set up using cloth and plastic. Various goods are stocked in the markets and includes foodstuffs, furniture, clothes, curios and hardware. The foodstuffs sold in the various markets include vegetables, fruits, unprocessed grains and cereals, fish, livestock, edible wild tubers, bulbs and roots. During the fieldwork, the team visited markets and retail centres within different commercial and residential areas in Kitwe. The main markets that were visited are discussed below.

Chisokone market

Chisokone market is one of the largest and busiest markets in Kitwe. The market is located within the city centre, adjacent to the bus station and has approximately 9000 traders. The market serves as a wholesale market although smaller quantities can be bought as well. Chisokone Market sells a range of goods, including: foodstuff, groceries, furniture, hardware goods and clothes. The foodstuffs on sale include fish, cereals, vegetables, fruits, beans and an array of indigenous food stuffs. Marketers who sell similar items are grouped together so the market is visibly distinct and with hardware, appliances, furniture, clothes, and perishables being sold in different sections. Just behind Chisokone Market is a Obote market which stocks curios and handicrafts various art and craft stalls.
Nakadoli market

Nakadoli market is located in Chimwemwe township. There are two markets on site, referred to as the old Nakadoli and new Nakadoli market. The new Nakadoli market has formal structures and shops and was constructed by the municipality. A visit to the new Nakadoli market revealed that most of the shops were not operational. According to some of the traders, the high rental fees are a deterrent and as such a lot of the marketers continue to trade in the old Nakadoli market. The old Nakadoli market is located behind the new market and most of the structures are made from wooden trusses and metal. Marketers trade in various which include hardware, appliances, furniture and foodstuffs. There is also a very big charcoal market adjacent to it.

Other markets visited include the Buchi-Kamitondo market and Chipata market.

Formal retail: Shoprite

Shoprite is one of the major retailers in Zambia and have 28 stores across the country. The retail outlet stocks a range of locally procured goods as well as imported food products.
ENERGY

The primary energy sources in Zambia include biomass, hydropower, coal, petroleum and various sources of renewable energy (Central Statistical Office, 2007).

Electricity – Hydropower

Electricity is Zambia is generated from hydropower and contributes approximately 10% to the national energy supply. The installed capacity of hydropower is about 2,177 megawatts and an unexploited hydro potential of approximately 6,000MW (Zambia Development Agency, 2014). The major consumer for electricity is the mining industry accounting for about 68% followed by households which use 19% (Central Statistical Office, 2007).

Biomass

Biomass energy is Zambia consists largely of wood fuel. Zambia’s woodlands and forests cover approximately 50 million hectares and provide wood as a fuel source and a construction material (Serenje, Chidumayo, Chipuwa, Egnéus, & Eliegård, 1994). Wood fuel dominates energy consumption in Zambia accounting for approximately 70% of the country’s energy needs (Jumbe, Bwalya, & Husselman, 2008). In addition to being an importance income source for many rural households, wood fuel is the principal fuel used in both rural and urban households (Jumbe et al., 2008). The main types of woodfuel derived from natural woodlands, forests and agricultural lands are charcoal and firewood (Serenje et al., 1994). Some of the firewood and charcoal used is derived from the wood-processing industries and recycled wooden products. Firewood is predominantly used in the rural areas the main source of household energy, while charcoal is the major fuel used within the urban and peri-urban areas. Most of the charcoal is produced in the Copperbelt, Central and Lusaka provinces (Jumbe et al., 2008). Some of it is sold from homesteads and along the roads and the rest is transported to municipal markets around the country. The charcoal is transported from production areas to the market using different transport modes such as ox-carts, bicycles and vehicular transportation (i.e. open vans, trucks, buses and lorries). Non-motorized transport is normally used to transport charcoal for short distances while motor transport is used for longer distances (Serenje et al., 1994). The charcoal is used in a
traditional stove that is made from discarded metal sheets or scrap metal (Serenje et al., 1994). This tin stove is commonly referred to mbaula and has a densely perforated chamber where the charcoal is placed. The charcoal is ignited using kerosene until it glows and is then used for cooking. The ash that is formed during the burning process collects at the bottom of the stove and is often disposed off in the rubbish dump.

**Petroleum and gas**

Petroleum is another energy source in Kitwe and refers to all products produced from crude oil, namely petrol, diesel, Jet A1, kerosene and liquified petroleum gas. Petroleum requirements in Zambia contribute to approximately 12% of the national energy requirement (Zambia Development Agency, 2014). All of the petroleum products are imported. Kerosene is used for heating and cooking especially in low-middle class households and the rest of the petroleum products are used to power engines for either aircrafts or motor vehicles.

**Renewable sources**

While wood fuel, hydropower and petroleum are the major energy sources in Zambia, there is a potential for a variety of renewable energy sources. These include solar, wind, mini-hydro and geothermal. Although these renewable energy sources occur in reasonable quantities, their use is limited and they remain largely untapped (Serenje et al., 1994). Currently, these are being explored as feasible means of developing and expanding the energy sources. The expansion of biomass and mini-hydro power plants is also feasible options that are under discussion (Central Statistical Office, 2007).

**Energy uses in Kitwe households and food sector**

Different sources of energy are used in Kitwe. Charcoal is the predominant source of energy used for cooking in Kitwe and is sold in various markets and along the roadside (See Figure 2). The charcoal comes from forests and woodlands in and around Kitwe. The charcoal is transported in trucks or lorries to the marketplaces. From the market places, the charcoal is repackaged into plastic bags before retail. Although charcoal is preferred as a cooking source, firewood and wood pellets are also used as cooking fuels.
Liquid Petroleum Gas (LPG) and kerosene are other sources that are used. These are sold through petrol stations and various retailers throughout the city.

Figure 2: Charcoal  
(Photos: Lesley Sibanda)
TRANSPORT NETWORKS AND INFRASTRUCTURE IN KITWE

Different modes of transport are used to transport various foodstuffs. The predominant transport channel used is road. The road network in Kitwe provides regional and national connectivity. Most of the roads are paved and in good condition. Lorries and trucks are used predominantly to transport goods over large distances and some of the traders use public transport in the form of buses, mini taxis to transport their goods from the main market to their places of trade (Figure 3). Railway transport offers another mode of transport particularly for large bulk commodities and time-insensitive goods. Air transport is used to transport highly perishable foodstuffs into and out of regional and international markets.

Figure 3: A lorry doing deliveries in Nakadoli market (Photo: Lesley Sibanda)
OVERVIEW OF WASTE MANAGEMENT IN KITWE

Waste management is a considerable challenge in Kitwe (Figure 4). Approximately 110,754 tonnes of waste is generated in Kitwe annually with 80% of the waste coming from residential areas (Mwitwa, Sibajene, Chipoya, & Namiluko, 2016). The rest of the waste is generated in public areas. It has been estimated that only 25% of the total waste generated is adequately collected and properly disposed of. The rest of the waste accumulates in the City and most of the waste is incinerated causing bad smells and air pollution (Mwitwa et al., 2016).

Both the Kitwe city council and private collectors provide waste management services. There are also a number of community based organizations and NGOs providing waste management services especially in low-income areas. Private companies provide door-to-door waste collection services and this is limited to households that have subscribed to the services. As a result, private waste collectors operate mainly within the commercial sector and in middle to high-income residential areas. Kitwe City Council collects waste mainly from communal dumpsites that are located in strategic places. These communal sites have skips where the rubbish can be thrown. Both the council and private waste collectors use a combination of refuse compaction vehicles, open trucks and vans for collecting waste. The waste that is collected is disposed of at a dumpsite at Uchi.

In the markets, there are dedicated spots for disposing waste. The waste mainly of organic waste, plastics, cardboard and a lot of old sacks. This waste is collected by Kitwe City Council once a week and transported to the local dumpsite. On days that the waste is not collected, the marketers burn the waste piles.

The walkabout revealed that there is currently inadequate solid waste management and as a result, a lot of waste accumulates on open lands causing environmental pollution and clogging of drainage systems. The waste piles are a breeding ground for rats, rodents and flies. They also pose a significant health risk. In areas with no waste
collection services, incineration of waste is the most popular disposal method. There is currently very little recycling occurring in Kitwe.

An overview of Kitwe’s waste system is illustrated in Figure 5 below.

Figure 4: Communal disposal sites (Photos: Lesley Sibanda)
Solid waste generation from
- Households
- Markets
- Industries
- Institutions

Temporary waste storage onsite (bins)

Collection by private sector

Communal waste disposal points

Collection by municipality

Disposal at Landfill

Informal disposal (of uncollected waste)
- Incineration
- Burying
- Illegal dumping

Informal waste pickers (at a very small scale)

Recycling industries (small scale)

Incineration

Figure 5: Kitwe’s solid waste management system
MAIZE

Maize is an important staple crop in Zambia and is consumed by about 90% of the population (FAO, 2009), accounting for almost half of Zambia’s calorie intake (Abrahams, 2010). Maize is largely produced by smallholder farmers and accounts for approximately a quarter of the total gross value of smallholder crop output in Zambia (Abrahams, 2010). Maize is typically milled into flour and consumed as either porridge or nshima. Nshima is the base of the diet in Kitwe and is made from milled maize, which is or cooked with boiling water until it thickens into a dough-like paste. Porridge is normally given to young children as a breakfast meal while nshima is consumed for midday and evening meals. The nshima is often served with different types of relishes made with vegetables, pulses, meat or fish (Denison, 2011).

The maize meal market in Kitwe is consists of maize meal milled from the commercial sector and from the more informal hammer mill industry. The milled maize is often referred to as mealie meal. The commercially processed maize meal is milled using industrial scale roller mills and more technically advanced equipment, which separate the germ from the bran. The two main products from the commercial sector can be classified as either the first-grade breakfast meal or the second-grade roller meal. The breakfast meal is more refined than the roller meal. According to the traders, the roller meal is healthier and encouraged for people with health problems. Both grades can be found in the open markets, supermarkets and other retail outlets.

Consumers who do not like the commercially processed maize meal buy maize grain in the markets and have it milled at nearby hammer mills. The hammer mills vary in size and produce a coarser and unrefined mealie meal. This mealie meal is referred to as mugaiwa. In the markets, the processed breakfast meal and roller meal are available and the traders sell in smaller quantities than the commercial millers. These smaller quantities are preferred by consumers with limited financial resources. However, inconsistent availability of maize grain especially off-season also means a lot of consumers have to purchase the commercially processed mealie meal.
Maize is also sold as green maize. This is mostly when it is in season. The fresh maize is often boiled and sometimes grilled. Roadside traders grill maize over charcoal mbaulas and sell this as a snack (Figure 7).
Besides nshima and porridge, maize is also processed into a beverage known as maheyu or munkoyo. Maheyu is a popular drink that is often produced at home for domestic consumption but is also sold in the markets. The beverage is made from mostly from crushed maize and water although finger millet, sugar, dried munkoyo roots (rhynchosia venulosa) and various other ingredients may be added to it. The roots provide sourness to the beverage and are sold in the open markets. Maize is also used for brewing and is the main ingredient in a local alcoholic beverage Chibuku. Chibuku is made from maize, sorghum and lactic acid and is consumed especially by the low-income population.

According to the market traders, poultry growers and cattle breeders also purchase maize grain. The maize grain is then processed into animal feed for poultry and cattle.

The maize value chain is illustrated in Figure 8 below.
Figure 8: Maize Value Chain

- **Pre-processed maize grain**
  - **Chisokone market (wholesale)**
    - **Nakadoli Market**
      - **Buchi Market**
        - **Processing (Milling)**
          - **Household preparation & consumption**
  - **Commercial processing**
    - **Distribution**
      - **Retail**
        - **Food service industry preparation & consumption**
          - **Disposal**
  - **Imports (Processed and milled maize)**

- **Processing (Hammer mills)**
  - **Commercial & small holder farming**
Fish is the most important animal protein source in Zambia. The fish value chain in Kitwe is complex and diverse (See Figure 11). Zambia has abundant freshwater bodies in the form of including rivers, dams, lakes, swamps, floodplains and streams (Mphande & Chama, 2015; Musumali, Heck, Husken, & Wishart, 2009). The water areas account for approximately 145 194km² which is about 19% of total territory (Musumali et al., 2009). There are eleven main fisheries, four of which lie in the Congo River basin and seven in the Zambezi basin. The fisheries in the Congo basin include Bangweulu, Mweru-Luapula, Mweru-Wantipa and Tanganyika (Musumali et al., 2009). The seven that lie in the Zambezi basin are Kafue, Kariba, Lukanga, Upper Zambezi, Lower Zambezi, Itezhi-Tezhi and Lusiwashi (Musumali et al., 2009). The total annual production from capture fisheries ranges from 65 000 to 80 000 tonnes. This is supplemented by an additional 5 000 mt from the aquaculture sector (Musumali et al., 2009).

Fishing in Zambia can be classified as either commercial or artisanal. The commercial fishing activities occur in Lake Kariba and Lake Tanganyika and are based extensively for the production of kapenta and talapia bream (Mphande & Chama, 2015). The artisanal fishing is mostly done by individual fishers who use canoes, baskets and traps for their catch. Approximately 50% of the total catch is bream followed by kapenta and catfish and these are the most commonly consumed fish (Longley et al., 2014).

A range of different fish is sold in the markets and these include tilapia, kapenta and chisense. The tilapia species (breams) are typically marketed fresh and to a lesser extent dried and smoked. Kapenta and chisense are usually marketed dried. In all the open markets, fish is sold as individual units or a heap or measured in a tin. A significant proportion of the fish is sold fresh. This is despite the fact that a lot of the landing sites are far from Kitwe. Some of the fresh fish produce in the market include the talapia bream and kapenta which are sourced from Siavonga which is located on the edge of Lake Kariba. The traders of the bream also sourced some of Lukanga Swamp which is in the Central Province. The bream is bought in buckets and kept in water to keep it fresh. Some of the traders display their fish produce on their stands and sprinkle water
every few minutes to keep the fish moist. This however, leads to a lot of water accumulating under the stalls resulting in a pungent smell and also being a breeding ground for mosquitos. Most of the fresh fish produce is not covered and flies are constantly hovering over the fish. Some traders have made fans out of plastics and bottles and use that to bat away the flies. Freshwater eels was also available in the markets and was sourced from Makubwe river. Most of the fresh talapia is sourced through Lake Harvest. Lake Harvest have operations on Lake Kariba and transport the catch using refrigerated trucks to their distribution centres in Lusaka and Kitwe. From the centres, the fish is then distributed on to large retailers such as Game, Shoprite and other retail outlets. The centres also serve as wholesale outlets for marketers and retail outlets for individuals who want to purchase fish.

Figure 9: Fresh and frozen fish in the markets (Photos: Lesley Sibanda)

Chilled and frozen fish products are dominant in both the open markets and retail outlets like Shoprite (Figure 9). Most of the frozen products are imported. The main ones available in the market include mackerel and bream which are imported from Nambia and China respectively. The marketers buy frozen mackerel from Lake Harvest who import it directly from Namibia and the Chinese bream is sourced from a retailer in
Ndola. However, there are no storage facilities in the markets and so the fish is not kept frozen throughout the day. The traders indicated that fish that is not sold at the end of the day is taken home where they refreeze it overnight and bring it back the next day. This is a significant health risk.

In Shoprite, there is a wide range of imported chilled and frozen fish products. The imported products include mackerel from Namibia; calamari rings and a seafood mix from China and prawns from India. There are also a variety of locally procured chilled fish products. These are mostly sourced through Capital Fisheries Ltd and include Nile perch fillets, tilapia fillets, horse mackerel, bukabuka fish, bream and frozen kapenta. These are all consisted higher-value fish products.

Preserved fish dominants the open markets but is not available in the supermarkets (Figure 10). In the market, the smoked fish is sourced from Luwanga and Luapula river. The most common fish that is smoked include the freshwater eel, bream and the pabo fish. The pabo fish is caught in the Luupula River which forms part of the border between Zambia and the Democratic Republic of Congo. Another processing method that is prevalent is sun drying. Much of the fried fish in the markets was sourced from Mungu which is located in the Northern Province. Some of the fish is salted before drying, but some is not. Salted bream is imported from Tanzania and is mostly caught in Lake Rukwa and Lake Tanaganyika. Kapenta is another fish that is typically sun dried. Over 15 different types of Kapenta were identified in the markets and these are differentiated mainly according to colour and size. Kapenta is sun-dried whole, although other post-harvest methods such as brining, dry salting, freezing and mechanical-drying are common. In addition to domestic markets, the traders especially at Chisokone market service the regional market as some of their produce is bought by cross border traders to the Democratic Republic of Congo (DRC).
Figure 10: Different varieties of Kapenta (Photos: Lesley Sibanda)
Small scale fishing: Fresh fish from Lake Lukanga

Middlemen/Brokers/Purchasing agents

Commercial fishing & fish farming

Imports
From Namibia, Zimbabwe, China

Processed fish (local & imports)
Sundried, smoked, fried, salted

Chisokone Market (Wholesale)

Commercial processing

Nakadoli Market

Distribution

Buchi Market

Retail

Tuntemba (Stalls)

Food service industry preparation & consumption

Household preparation & consumption

Disposal

Exports

Figure 11: Fish value chain
RICE

Domestic rice production is largely done by smallholder farmers in Zambia. Approximately 50% of the production is in the Northern Province with the rest coming from the Western and Eastern Provinces (Chemonics International Inc., 2009). Small

Most of the produce from smallholder farms is bought ACP Milling and the National Milling Company. The produce is transported to the mills for processing before being distributed for wholesaling and retailing. A mixture of different varieties and brands are available in both supermarkets and local open markets like Chisokone and Nakadoli markets. In the supermarkets, there is a wide variety of imported rice mostly from South Africa, Thailand, Vietnam, Pakistan and India. Also on the shelves is imported rice that has been repackaged in Zambia by the National Milling Company. A limited range of local rice is available in supermarkets. A mix of local and imported rice is available in the open markets. According to the traders, local rice is more expensive than the imported rice from Asia and Tanzania despite the fact that imported rice is often of a superior quality.

The rice value chain is depicted in Figure 12 below.
Figure 12: Rice Value Chain

Smallholder rice growers

Small-scale millers and polishers

Tuntemba (Stalls)

Food service industry preparation & consumption

Commercial milling & processing

Nakadoli Market

Retail

Commercial rice growers

Agents/Brokers

Imports

Nakadoli Market

Buchi Market

Food service industry preparation & consumption

Household preparation & consumption

Distribution

Commercial growers

Disposal
GROUNDNUTS

Groundnuts (*Arachis hypogaea*) form a large component of the traditional Zambian diet and are an important nutritional component especially in rural and urban low income households (Denison, 2011). Groundnuts are the second most important crop after maize both in terms of hectares cultivated and production volume (Mofya-Mukuka & Shipekesa, 2013). Production of groundnuts ranges between 100,000 to 160,000 MT nationwide and is mostly undertaken by small-scale farmers (Mofya-Mukuka & Shipekesa, 2013). Groundnuts can be consumed raw, roasted (in-shell and shelled), boiled (in-shell and shelled), pounded into a paste and or added as a relish to various dishes (Denison, 2011). Processed products such as peanut butter, peanut snacks, sweets and cooking oil are also common and available through various supermarket outlets. These processed products were however not available in the open markets.

In the markets, both shelled and unshelled groundnuts are commonly found (Figure 13). These nuts are sourced either directly from the farmers or through intermediary agents. These agents purchase the groundnuts from different villages and transport to the markets where they sell to the traders. The groundnuts are stored in sacks and transported either on trucks or by rail depending on where the nuts were sourced from. The shelled groundnuts are ground into peanut meal and cooked in different relishes. Small grinding machines are available in the markets and some of the traders charge a small fee for the grinding (Figure 14).

The groundnut value chain is depicted in Figure 15 below.
Figure 13: Shelled peanuts (left) and peanut powder (right side) (Photos: Lesley Sibanda)

Figure 14: The grinding mill used to make peanut powder in Nakadoli market (Photos: Lesley Sibanda)
Figure 15: Groundnut value chain

Small holder farmers

Purchasing agents/Intermediaries

Chisokone Market

Nakadoli Market

Buchi Market

Street vendor

Household preparation & consumption

Commercial farmers

Imports (from outside of Zambia)

Commercial processing / packaging: Peanut butter/oil/snacks

Distribution

Retail

Food service industry preparation & consumption

Exports to regional & international markets

Processing:
Roasting
Peanut Powder
Salting
TOMATOES

The botanical name for tomatoes is *Lycopersicon esculentum mill* (Jeke, 2011). Tomatoes are a high value fruit and are consumed in most households throughout Zambia. Tomatoes are extensively grown in Zambia although the major production areas are located in the Copperbelt, Central and Eastern Provinces.

In Zambia, tomatoes are one of three most consumed fruits or vegetables, the others being onion and rape (Jeke, 2011; Tschirley & Hichaambwa, 2010). The three staple products have a combined budget share of 9.1% of consumer food expenditure. This is higher than the expenditure of other food groups except for cereals staples, eggs and meat (Tschirley & Hichaambwa, 2010). Production of tomatoes is conducted by both smallholder and commercial large scale farmers. Most smallholders do not have access to irrigation facilities and as such most of the tomatoes they produce are rain fed (Tschirley & Hichaambwa, 2010). The supply of tomatoes from small holder farmers is mostly in the dry season whereas commercial farmers produce tomatoes throughout the year (Tschirley & Hichaambwa, 2010).

The tomatoes in the markets were primarily sourced from Mkushi which is located in the Central Province. The traders have a standing order and new stock is delivered every two days. The tomatoes are transported to Kitwe using open trucks and minibuses. Within Kitwe, bicycles and small vehicles are used to transport tomatoes between the various markets. To cut down on transport costs, traders form groups and collectively hire a vehicle to transport their goods. According to traders, the price of tomatoes varies depending on the season. During the rainy season, the supply of tomatoes is low and so the traders are able to demand high prices. In the dry season, the prices are lower as tomatoes flood the markets due to the higher production levels. In the open markets, tomatoes are sold in heaps and plates at varying prices depending on the size and appearance of the tomatoes. A few of the traders have scales to weigh the tomato piles but most traders have a fixed price for the tomato piles or batches. Small retail markets in the residential areas and street vendors sell tomatoes in piles or as an individual fruit (Figure 16).
Supermarkets like Shoprite sell tomatoes based on the weight. Consumers have a choice of selecting pre-packaged tomatoes or selecting the individual tomatoes and weighing these (Figure 17).

Rotten tomatoes are collected and sold disposed of in bins which are collected by Kitwe City Council once a week.
Tomatoes are bought and consumed as raw fruits or used in cooking different relishes. A variety of processed tomato products are available in the supermarkets. These include canned tomatoes, tomato puree, tomato paste, tomato sauce (referred to as ketchup) and tomato soup. In the marketplace, the only processed tomato product available is tomato powder. Tomato powder is made from dehydrated tomatoes and is sourced already processed. The powder is then used for making soups and curries.

Kitwe’s tomato value chain is illustrated in Figure 19 below.

Figure 2: Dehydrated tomato powder (Photo: Lesley Sibanda)
Figure 19: Tomato value chain

- Small holder farmers
- Purchasing agents/Intermediaries
  - Commercial processing/packaging: Canning, freezing, pastes, & sauces
- Commercial farmers
- Imports (from outside of Zambia)
- Chisokone Market
- Nakadoli Market
- Buchi Market
- Street vendor
  - Household preparation & consumption
  - Food service industry preparation & consumption: (restaurants, fast food outlets, functions, events)
- Distribution
- Retail
- Home garden cultivation
- Disposal
INDIGENOUS LEAFY VEGETABLES

The indigenous leafy vegetables include numerous species that are either cultivated or that grown in the wild. In some cases, some of the species are cultivated as pods, tubers, roots and fruits but their leaves are considered a vegetable. The main species are cabbage, amaranth (referred to as bondwe) rape, bush okra (delele), african eggplant (impwa), chinese cabbage, matambula, sweet potato and cassava leaves (Hichaambwa, Beaver, Chapoto, & Weber, 2009) (Figure 20). According to a national food consumption survey conducted in 2008, rape is the most consumed vegetable followed by local leaves and cabbage (Hichaambwa et al., 2009).

A lot of the green leafy vegetables comes from both commercial and smallholder farmers. The produce is either sold directly to the marketers or through brokers. Although a significant amount of the fresh produce that is indigenous to Zambia is retailed through open air markets and street vendors, more supermarkets are beginning to stock indegeneous vegetables. The open markets situated in the city centre and in various residential markets stock a broad range of vegetables such as okra, rape, cabbage, spinach. According to the traders, most of the vegetables are sourced from farms in Kalulishi and Chapula which both are located in the Copperbelt province and also from Mansa which is in the Luapula Province. The vegetables are transported mostly by road and are often packaged in sacks for easy transportation. Once in the markets, the vegetabled are repackaged into small bundles and packaged in small plastic bags.
Fresh green leafy vegetables start to deteriorate and lose their quality immediately after harvest and wilt. To minimise wastages, a lot of the vegetables are dried (Figure 21). According to the traders, most of their preserved vegetables are sourced already pre-processed. The dried vegetables are less bulky than fresh ones and can be easily transported and stored for longer periods. The main methods of processing that are commonly used is sun drying and blanching. The green green leafy vegetables are sliced or chopped and placed in hot water for a minutes before being drained and sundried. The sundried vegetables are darker in colour and are then stored in sacks ready for resale.
Okra is another popular vegetable. Most of it is processed by sun drying. The okra is cut into small pieces and sun dried. Sometimes the sun dried okra is milled into a fine powder. According to the traders, okra powder is preferred by a lot of consumers as it is easy and quick to make (Figure 21). The okra cubes and powder can be stored for long periods and are popular in the dry season when fresh okra is scarce.

The different varieties of vegetables have similar value chains and as such only one value chain illustration was drawn (Figure 22).
Figure 22: Indigenous vegetable chain
WILD EDIBLE MUSHROOMS

Wild edible mushrooms are a naturally abundant resource and provide an important source of food. Mushrooms are season and as such are only available during the rainy season. According to Jumbe et al. (2008), there are approximately 25 different species of edible mushroom species that are documented in Zambia. Most of mushrooms are collected from forests and woodlands. Fresh mushrooms are popular in the rain season and a significant proportion of the mushrooms are preserved for later consumption.

While most of the mushrooms in Zambia are harvested in the wild, a small percent is cultivated. The most popular cultivated mushrooms are the white button mushroom and the oyster mushroom. These are grown on a very small scale. The open markets stock a wide variety of mushrooms (commonly refereed to ubowa). These mushrooms vary in colour and sizes. Most of the mushrooms are sourced from Luangwa in Lusaka province.

There were no fresh mushrooms in the markets and this could be due to the fact that the rainy season was over when the fieldwork was conducted. However, Shoprite stocked both local and imported fresh mushrooms (Figures 23 and 24).
Because of the seasonality of mushrooms and to extend the shelf life, most of the mushrooms sold in the markets are preserved (Figure 25). The most common preservation methods that are used include boiling, sun drying, smoking and salting. Preserved mushrooms are sold in the open markets in different unit measures depending on the quantities. Baskets, tubs and tins are used for larger volumes in Chisokone and Nakadoli markets. In the residential markets such as Buchi, small tins, cups, plates and heaps of varying sizes are used as a unit of measure.
The mushroom value chain is illustrated in Figure 26 below.

Figure 25: Preserved mushrooms on sale in the open markets (Photos: Lesley Sibanda)
Figure 26: Wild mushroom value chain

[Diagram showing the value chain of wild mushroom from woodlands and forests to household preparation and consumption, involving collectors/brokers/middlemen, Chisokone Market, Nakadoli Market, Buchi Market, street vendor, and retailers.]
BEANS

Beans are a cash crop in Zambia and are widely consumed in the whole of Zambia especially in low income households. Beans are an important legume and major source of dietary protein as well as income for rural households (Birachi, 2012). Production of beans is done mainly by small scale farmers in regions with medium to high rainfall patterns (Chalwe, 2011). Although beans are grown in most Zambian provinces, only four provinces are considered major bean growing areas. The Northern province accounts for the majority of bean production which is 62% of the total bean production in Zambia. This is followed by the North Western province (8%), Central (7%) and Luapala (6%) (Chalwe, 2011).

Most of the beans is bought by intermediary agents who source directly from the farms and sell to the traders in the markets. The beans are transported in trucks and normally packaged in sacks. In the market place, the beans are sold in cups or tins of varying quantities. According to the traders, most of the beans are sourced from Mbala (Northern province), Solwezi (North Western) and Lundazi (Eastern). Different varieties of beans are available in Kitwe and are sourced from different places. The beans are of different colours and are priced differently. The key varieties on sale in the markets were the yellow beans (referred to in the market as Lusaka beans); white beans (aka serenge beans); purple beans (kabulangeti beans), brown beans (referred to as sugar beans) and lastly the red beans from Solwezi. Of all the varieties, the kabulangeti beans seems to be the most preferred beans and its imported from Tanzania (Figure 27).
Shoprite stocked both local and imported beans. However, their stock was limited to only one variety of beans, which were the red speckled beans. The imported beans were from South Africa and China.

The beans value chain is illustrated in Figure 28 below.
Figure 28: Beans value chain

- Small holder bean producer
- Collectors/Agents/Brokers/Middleman
- Chisokone market (wholesale)
  - Commercial processing & packaging
    - Pre-packaged dry beans
- Nakadoli Market
- Buchi Market
- Tعتمba (stalls)
- Household preparation & consumption
- Distribution
- Retail
- Food service industry preparation & consumption
- Disposal
- Imports from South Africa & China
  - Exports to Zimbabwe, DRC, South Africa
EDIBLE CATERPILLARS

In Zambia, more than 60 different species of insects are consumed as food and provide an important source of protein (Jumbe et al., 2008). Of these species, caterpillars are the leading edible insects and the most commercially traded. The caterpillars are very rich in both protein and crude fat and can be found in other parts of Africa such as South Africa, Botswana, Mozambique and Zimbabwe, and Zambia (Ghaly, 2009). There are approximately 30 species of edible caterpillars found in Zambia but the most common and well known species is the *Gonimbrasia belina*, known locally as mopane worms (Ghaly, 2009; Jumbe et al., 2008).

Mopane worms are seasonal and are harvested in mopane woodlands from November till January. The worms are colled from both trees and on the ground. Once collected, the worms are disembowed by squeezing them to remove the guts and then rinsed with water (Kozanayi & Frost, 2002). The worms are then roasted over charcoal and then dried in the sun. Roasting removes the spines and as such is the most preferred processing method as the end product can be sold at higher prices (Kozanayi & Frost, 2002). Another common processing method is to boil the worms before drying them. In this method, the spine boiled worms retain their spines and this reduces their market value (Kozanayi & Frost, 2002). The dried worms are packed in sacks and transported to various markets.

In the market places, mopane worms were the most displayed worms. However, other varieties of worms were available. The mopane worms were greyish-black in colour and were sourced from Chinsali in Muchinga Province and Chipinga. Another variety was the finkubala. These are yellow in colour and are sourced locally from Mansa in the Luapula Province and some are imported from Botswana. The worms are in a range of unit sizes and are measured using small cups and large tins.
There were no worms in the supermarkets and as such it has been assumed that no commercial production and processing of mopane worms is being undertaken.

The caterpillar value chain is illustrated in Figure 30 below.
Figure 30: Edible Caterpillars value chain

- Woodlands and forests
- Processing
  - Brokers/Middlemen
  - Chisokone Market
  - Nakadoli Market
  - Buchi Market
  - Street vendor
  - Household preparation & consumption

- Imports from Botswana, South Africa, Zimbabwe
- Exports to DRC & other regional areas
- Woodlands and forests
- Disposal
- Food service industry preparation & consumption
REFERENCES


