

Food and Agriculture Organization of the United Nations

RUAF FOUNDATION



CITY REGION FOOD SYSTEM SITUATIONAL ANALYSIS

Kitwe, Zambia

FAO - Food for the Cities Programme



- WORKING DOCUMENT -



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With support from



by decision of the German Bundestag

ABOUT THIS REPORT

City region food systems (CRFS) encompass the complex network of actors, processes and relationships involved in food production, processing, marketing and consumption in a given geographical region. The CRFS approach advocates for strengthened connectivity between urban centres and surrounding areas –whether peri-urban or rural– for a fair rural development and well-managed urbanisation. At the same time, it fosters the development of resilient and sustainable food systems, smallholder agriculture, sustainable rural and urban production, employment, improved livelihoods, and food and nutrition security for all.

The Food for the Cities Programme aims at building more resilient and sustainable food systems within city regions by strengthening rural-urban linkages. The programme builds on the demand to better understand and operationalize the concept of city region food systems. It analyzes and assesses CRFS. The results will serve as a basis for further planning and informed decision-making, prioritizing investments and designing food policies and strategies, which aim at improving the resilience and sustainability of the entire food system, through a continuous participatory multi-stakeholder dialogue.

In collaboration with the RUAF Foundation, projects are carried out in eight city regions: Colombo (Sri Lanka), Dakar (Senegal), Kitwe and Lusaka (Zambia), Medellin (Colombia), Quito (Ecuador), Toronto (Canada) and Utrecht (the Netherlands).

This report describes the first phase of the city region food system (CRFS) assessment. This phase consists of a descriptive assessment and appraisal of the local context and CRFS, primarily based on the analysis of secondary data, stakeholder interviews and consultations. It provides an overview and description of the local context (including the political and institutional environment) and its CRFS. It includes a definition of the geographical boundaries of the CRFS, an overview of its overall structure and characteristics, an analysis of how it functions, stock of baseline information and identified gaps, and, to the extent possible, an indication of general trends and critical issues relevant to increase the sustainability and resilience of the specific CRFS. These key issues will be further examined in the next project phases: in-depth assessment and policy planning phases.

The situation analysis builds on secondary data. Secondary data includes information from spatial datasets, statistics, studies, institutional, policy and legal frameworks, and information obtained from local expert knowledge through stakeholder consultations, focus-group discussions and interviews.

The report was prepared by Jacob Mwitwa (Copperbelt University), Mainza Sibajene (Kitwe City Council), Gilbert Chivanga Chipoya (Ministry of Agriculture), Yaki Namiluko (Copperbelt University) with assistance and guidance from Guido Santini, Yota Nicolarea, Louison Lançon and Diana Gutiérrez from FAO's Plant Production and Protection Division (AGP).

SUMMARY

Introduction and definition of the Kitwe City Region Food System (CRFS)

The situation analysis was prepared through the collection, review and analysis of existing information; and the collection of GPS points for farming areas, retail and markets, supermarkets and the location of district agricultural offices in all the ten districts of the Copperbelt Province (termed "core and peripheral region"). Prior to the collection of secondary information, the Multistakeholder Task Team (MTT) defined the Kitwe city region food system as composed of:

- i. *Primary or Core Region:* Region within legally recognized administrative boundaries for Kitwe district;
- ii. *Secondary of Peripheral Region:* Region excluding *core* and *tertiary region* but inclusive of all the surrounding districts with which Kitwe shares administrative boundaries and from which the Kitwe food system is supplied with agricultural produce, livestock and poultry products;
- iii. *Tertiary or Other Region:* Region outside the *secondary region* but from which the Kitwe food system obtains agricultural, livestock and poultry products.

The criteria for the definition of the city region

- i. Administrative boundaries define the region of the city over which the Kitwe City Council has jurisdiction and whose by-laws are applicable within the city region (taking urban and peri-agriculture into context) when urban and peri-urban agriculture is taken into context.
- ii. City region food system is definition is based on
 - *Food system:* Sources of processed and unprocessed agriculture, livestock and poultry products consumed, marketed or distributed within and, for products produced within the city region, outside the city region.
 - *Governance:* Potential to establish interventions in terms of producer capacity and improvement of value chain, infrastructure and facilities.

The areas of the food system are:

- i. Input supply and production (crops, livestock and poultry products);
- ii. Storage, processing and manufacturing;
- iii. Wholesale and distribution;
- iv. Consumption and nutrition;
- v. Marketing, catering and distribution;
- vi. Food organic waste management;

Education, primarily agricultural extension, gender and health are crossing cutting issues.

CRFS Stakeholders

As mentioned above, the food system assessment in the city region of Kitwe is a highly participatory process promoting local ownership. In this light, key players involved in the food system of the city

region of Kitwe such as government departments, civil society/NGOs, the private sector, research institutes and academic institutions, play a significant role in shaping the local food system.

More specifically, stakeholders in the Kitwe CRFS can be organized under the following categories:

- Direct participants in the food value chain: Corporate entities, civil society, traders and producer representatives that provide technical services and inputs to farmers.
- Organisations that provide awareness and communication: farmer organisations and other civil society organisations such as the Kitwe District Land Alliance (KDLA), National Traders and Marketers Association of Zambia (NATMAZ), World Vision Zambia, Sustainable Agriculture Programme (SAP), Zambia National Farmers Union (ZNFU).
- Institutions and organisations that formulate, influence and implement policies and legislation: the Kitwe City Council and government entities such as the Ministry of Agriculture, Forestry, National Agriculture Research and Development Centre and Cooperatives.
- Institutions and organisations that have advisory roles: academia and research institutes, such as the Copperbelt University.
- Elected officials: elected officials within the CRFS, ward Councillors and District Agricultural Coordinators (in charge of managing the agricultural sector) are the senior public servants in the district public service within the CRFS.

Their roles are sometime interlinked, without noticeable significant conflicts. Some of the stakeholders have a policy and management role and may therefore be more influential in terms of governance and management than other stakeholders. The reason is that these are national institutions, with the exception of Kitwe City Council (KCC), who have a legislative role to play in the food system. However, other stakeholders fill up critical gaps in the food system that KCC, District Agriculture and the Zambia Environmental Management Agency (ZEMA) cannot fulfil. These include civil society, research institutes and academia.

National policies, legislation and strategies

In terms of agriculture, which has been prioritised as the most important sector, the R-SNDP 2013-2016 indicates that more than 50% of Zambia's population is employed the agriculture sector and therefore, agriculture development is critical for achieving inclusive growth and poverty reduction. The challenges that have been targeted in order to transform the sector include:

- i. Unbalanced agriculture policies which have favoured maize production and disadvantaged the production of other crops;
- ii. Inadequate utilisation of research and development, farm mechanisation, science and technology and ICT to increase yields and maximise the comparative advantage of different areas of the country and access production and market information;
- iii. Poor storage, inadequate irrigation and other infrastructure challenges have resulted in post-harvest wastages and over-reliance on rain-fed agriculture.

The agriculture sector is managed through the National Policy on Agriculture 2004-2015 with other sector policies and legislations playing a role in agriculture management such as *Environmental Management Act No. 12 of 2011; Fisheries Policy of 2015 (Draft) and the Fisheries Amendment Act No. 22 of 2007; Forest Policy of 2015 and Forest Act of 2015; National Policy on Environment of 2007; Policy for National Parks and Wildlife in Zambia of 1998 and Zambia Wildlife Act of 1998; National Energy*

Policy of 2008; National Adaptation Programme of Action of (2007); Zambia Development Agency Act of 2006; Mines and Minerals Development Act (2008) National Environmental Action Plan (1994); National Biodiversity Strategy and Action Plan (1999); Zambia National Action Plan for Combating Desertification (2002); Lands Acts No. 29 of 1995; Public Health Act.

Snap-shot of the local context

Demography

In 2010, the Copperbelt Province had an estimated population of 1,958,623 out of which 973,770 are males and 984,853 are females. The average annual population growth rate in the 1990-2010 intercensal period for the Copperbelt Province was 2.0% for males and 2.3% for females. Even though actual statistics on poverty in each of the districts of the core and peripheral region are not available as yet, it has been reported that poverty changes by provinces in the period 2006 and 2010 was 37.3% and 34.3%.

Employment in agriculture, fisheries, forestry and hunting

An estimated 166,416 people are employed in agriculture, fisheries, forestry and hunting within the core and peripheral city region food system. This constitutes 32.5% of the total usually working population. In terms of age groups, the sector employs about 13% of the population which is 12 to 19 years of age. Within the core region food system however, only 5.3% (6,537) males and 3.6% (4,429) females of the total usually working population are involved in agriculture, fisheries, forestry and hunting. Out of this male group, 59.6% (3,882) are urban and 40.6% (2,655) are in the rural areas. In the female group, 56.3% (2,492) are in the urban and 43.7% (1,937) are in the rural areas. The largest producer age group is the 30 to 34 year group.

In terms of skilled agricultural, fisheries and forestry persons, out of 508,068 people constituting the usually working population, only 9,738 (1.9%) people in the core region and 145,868 (28.7%) people in both the core and peripheral regions are skilled agricultural, fisheries and forestry workers. The 28.7% skilled persons in the food system are concentrated in rural areas (75.1%) and the rest in the urban areas.

Characterization of Kitwe's CRFS

Environmental resources, land use and cover

The vegetation types of the Copperbelt Province, is characterized by a single storey of deciduous, closed canopy of Miombo woodland with common tree species being *Albizia antunesiana*, *Albizia versicolor, Anisophyllea* species, *Baphia bequaertti, Brachystegia boehmii, Brachystegia utilis, Isoberlinia angolensis, Julbernardia paniculata, Marquesia macroura, Pericopsis angolensis, Parinari curatellifolia, Uapaca kirkiana,* and *Uapaca nitida.* Mwekera National forest is characterized by large termite moulds of up to 6 meters and sometimes even more. Annual rainfall ranges between 800 and 1500 mm per year, and the average monthly minimum and maximum temperatures are 20°C and 36°C respectively.

The total land area for the Copperbelt Province is estimated at 31,328 Km² or 3,132,829 ha. Out of this 3,070 Km² (9.8%) is under cultivation in 2012 up from 8.6% in 2001 and 6.26% in 1990. The area under

agriculture, settlements moist soil-crop fields shows an increase of about 3.6% from 1990 to 2001. The decline in the size of the water body from 0.42% to 0.37% has both an advantage and a disadvantage.

The main river is the Kafue River, Zambia most economically important river, which passess through Chililabombwe, Chingola, Mufulira, Kitwe, Luanshya, Lufwanyama and Mpongwe districts. There are several perennial streams and rivers in all the districts which form part of the network of tributaries of the Kafue River. The main tributaries are Mwambashi River, Miengwe River, Kafulafuta River, Luswishi River, Mwekera River, Kafubu River and Chowa River.

Climate change and variability impacts

The Kitwe city region food system, particularly the core and peripheral region, is vulnerable to current and future climate change and variability, and has already recorded increases in temperature and reduced rainfall in the last few decades, with temperatures estimated to increase at 0.6°C every ten years. Frequency of occurrence of drought, seasonal floods and flush floods, extreme temperatures and dry spells along with their intensity and magnitude has also increased. For example, the onset of the 2015/2016 rainy season has been delayed in many parts of the food region particularly in the central, southern and western parts of Zambia. Some of the impacts have included droughts, floods, extreme heat and shorter rainy seasons.

Risk and vulnerability profiles have not been compiled for all districts and this has slowed the incorporation of risk reduction approaches into programmes of affected communities. The food region's adaptive capacity has largely been constrained by inadequate financial and technical resources that have compounded long-standing structural constraints to growth and development. Though climate change issues have been domesticated in some of the region's development plans, more resources need to be allocated, and program development and implementation need to be done in a more robust way. Additionally, institutions mandated to contribute to disaster mitigation efforts lack comprehensive proactive strategies to address climate change induced disasters, rendering their response to disasters mostly inadequate and transitory.

Agricultural and food value chain

The agricultural and food value chain is composed of farmer input supply, production, post-harvest handling, traders, food manufacturing companies, retailers and consumers. The value chain is defined by vertical and horizontal linkages with a range of players from civil society, farmer organisations, corporate entities, associations of traders and retailers, consumers and consumer organisations, financial institutions, research and training institutions, international organisations and government. Each node of the value chain is an agricultural area that has specific characteristics that link it to the other nodes with its challenges that may be unique or shared with other agricultural areas.

Input supply and food production

Agricultural inputs are supplied by a varied number of private entities that include Agro-dealers such as RIA-Agro, Swinney, Vinco and Farm City. These Agro-dealers are stockists for seed companies that include Zamseed, Seedco, MRI-Syngenta, Pioneer, Panar, Klein Karoo and Monsanto. Manufacturers of Agro-chemicals that is, pesticides (herbicides, insecticides and fungicides) also have presence in the entire CRFS. Among such firms is ATS Zambia headquartered in Ndola.

Small scale farmers have access to subsidised government inputs through the Farmer Input Supply Programme (FISP). The inputs are currently limited to basal and top dressing fertilizer as well as seed (maize, groundnuts, common beans, sunflower and soybeans). These inputs are distributed by Niyombo Investments to various districts after which local transporters deliver them to farmers in various localities, that is, agricultural camps.

The Copperbelt Province produces Cassava, Cow Peas, Groundnuts, Finger Maize, Millet, Mixed Beans, Paprika, Rice, Wheat, Sorghum, Soya Beans, Sunflower and Sweet Potatoes as major crops. Others are popcorn, Irish potatoes and Bambara nuts. Horticultural crops include oranges, mangoes, lemons, guavas, and avocado. Vegetables include cabbage, rape, Chinese cabbage, tomatoes, onions, green pepper and green maize. Copperbelt Province had one of the largest declines in the quantity of maize produced, from 206,000 MT in 2005/2006 season to 161,000 MT in 2008/2009 season, followed by Lusaka Province, down from 92,000 MT in 2005/2006 season to 74,000 MT in 2008/2009 agricultural season.

With regard to the peripheral region, Mpongwe is regarded as the leading district in terms of agricultural production. The district produces substantial amounts of Wheat, maize and soya beans. Major livestock include cattle, sheep, goats, chickens and fish. Masaiti and Lufwanyama are also major agricultural districts that are into the production of maize and groundnuts. Livestock include pigs, goats and cattle. The other districts, that is, Ndola, Luanshya, Mufulira, Kalulushi, Chingola and Chililabombwe also contribute to the food basket through considerable production of maize, soya beans, groundnuts and beans with Chililabombwe providing a huge outlet to the Congolese market.

The main pests and diseases attacking crops in the region are army worms in maize, aphids in cabbage and rape, diamond-back moth and cabbage rot in cabbage, red spider mites and leaf blight in tomatoes. Horticultural crop production is primarily affected by frost which is moderate with the major impact arising from pollution by industrial fumes.

In 2012 that the total population of large and small livestock is estimated at 219,216 (i.e. of cattle, goats, pigs and sheep). Large livestock made up 32% while small livestock constituted 68% of the estimated total population. Common scheduled diseases include east coast fever, anaplasmosis, black quarter, heart water, lumpy skin disease, tuberculosis and babesiosis in cattle. In avian notable scheduled diseases include fowl pox, newcastle and gumboro. Non-scheduled diseases experienced in cattle vary from malnutrition, retained placenta, mastisis, abortion, snake bites, dystokia, vitamin deficiency, poisoning and senkobo. Non-schedules diseases experienced among various avian species are usually cocciosis, omphalitis, fowl pox, enteritis and fowl cholera.

The challenges in supply and production of food, livestock and poultry products are:

- i. Variability of water quality driven by mining effluents, harmful biological agents, and other suspended solids;
- ii. Post-harvest losses leading to reduced availability of food stuffs;
- iii. High cost of agricultural inputs for small resource poor producers;
- iv. Poor storage facilities;
- v. Availability and access to reliable data and information;
- vi. Poor road infrastructure impacting production, processing, marketing, catering and retail;

- vii. Harmonisation of legislation and outdated city by-laws;
- viii. Loss of indigenous knowledge and systems for seed storage, production, processing and storage;
- ix. Inadequate and poorly coordinated extension services;
- x. Impact of climate change and variability resulting in low rainfall;
- xi. Non-assurance of reliable meteorological data;
- xii. Lack of rain water harvesting capacity and technical services;
- xiii. Inadequately developed irrigation facilities;
- xiv. Lack of access to finance;
- xv. Increase in number of counterfeit products on the market.

Food marketing, catering and retail

The core and peripheral region has a range of markets from roadside to formal municipal managed markets. Information on all markets in the region is not available in a single document. Some of these markets are large and have complex categories of retail/selling points which include those that are in Figure 13 whilst smaller markets are not as complex. A range of foods are sold in these markets from unprocessed grains and cereals, vegetables, fruits, livestock, and edible wild tubers, bulbs and roots. Retail outlets, international and local, provide both locally produced and imported grains and cereals, vegetables, fruits major retail outlets are supported by a number of roadside markets and Tuntemba which are largely informal.

Crops, livestock and poultry products are sold at wholesale and retail. There are fewer wholesale outlets for crops produced within the core and peripheral region which have undergone basic primary processing. The main wholesale is either at the farm level or in major markets such as Main Masala Market in Ndola and Chisokone Market in Kitwe. Product prices at the farm and market are different primarily due to the market player, demand and the cost of transportation. The retail market is significantly dominated by imported food products than regionally produced products. The retail sector is largely dominated by a town's market, followed by multi-national retail outlets and smaller locally owned retail outlets. The multi-national retail facilities are primarily concentrated in shopping malls while the smaller locally owned retail outlets are scattered all over town, including in residential areas. Other retail outlets that sell a large volume of products are the street vendors and informal trading points local y known as Tuntemba.

The challenges in food marketing, catering and supply are:

- i. Variability of water quality driven by mining effluents, harmful biological agents, and other suspended solids;
- ii. Post-harvest losses leading to reduced availability of food stuffs;
- iii. Inadequacy in process (value adding) infrastructure;
- iv. Poor storage facilities;
- v. High cost of rentals in improved market infrastructure;
- vi. Availability and access to reliable data and information;
- vii. Poor road infrastructure impacting production, processing, marketing, catering and retail.

Food marketing, catering and retail, consumption, safety and nutrition

There exist a number of food processing companies in the city region which process farm produce, livestock and poultry products into marketable and edible products. Distribution companies connect suppliers and manufacturers to retailers and consumers. The composition of staple food consumption in Zambia differs across food staple zones. The city region is in the part of the country in which households consume roughly equal quantities of both cassava and maize even the region does not produce most of the maize that it consumes. Before reaching the consumer, most foods consumed in the city region are transported, processed and distributed elsewhere. This affects food safety, food access and food security, and the viability of local and regional food supplies on the Copperbelt and the whole country. A successful food system not only produces healthful food, but is also structured so that this food is accessible to everyone.

When it comes to wholesale and food distribution, Zambia's food retail sector is divided into two branches; the informal which includes stands, "Tuntembas", and hawkers, and the formal market which includes supermarkets and other large formats. The growth of the modern formal channel is relatively new with Shoprite entering the market in 1995 with the purchase of state-run stores in major cities as a part of the economic reforms.

Food Supply and Distribution Systems (FSDSs) are usually complex combinations of activities, functions and relations (production, handling, storage, transport, processing, packaging, wholesaling, retailing and consumption among many others) that enable cities in the food system to meet their food requirements. All these activities are performed by different economic agents: food producers, assemblers, importers, transporters, wholesalers, retailers, processors, shopkeepers, street vendors, providers of services, packaging suppliers, public institutions, and private associations.

Zambia has been described as one of the 22 countries with the highest burden of under nutrition especially in children under the age of 5.

Challenges in food marketing, catering and retail are:

- i. Variability of water quality driven by mining effluents, harmful biological agents, and other suspended solids;
- ii. Post-harvest losses leading to reduced availability of food stuffs;
- iii. Inadequacy in process (value adding) infrastructure;
- iv. Poor storage facilities;
- v. High cost of rentals in improved market infrastructure;
- vi. Availability and access to reliable data and information;
- vii. Poor road infrastructure impacting production, processing, marketing, catering and retail.

Challenges in food consumption and nutrition are:

- i. Variability of water quality driven by mining effluents, harmful biological agents, and other suspended solids;
- ii. Climate change and variability impacts leading to low rainfall;
- iii. Post-harvest losses leading to reduced availability of food stuffs for consumption;
- iv. Inadequacy in process (value adding) infrastructure;
- v. Poor storage facilities;

- vi. Loss of indigenous knowledge and systems of food processing and storage;
- vii. Availability and access to reliable data and information;
- viii. Lack of effective food quality control systems in place;
- ix. Week outdated bye-laws for defaulters of food health and safety regulations.

Challenges of food safety are:

- i. Packaging, Storage and Processing;
- ii. Flooring;
- iii. Drainage;
- iv. Sanitary Facilities;
- v. Safe Water;
- vi. Storage infrastructure;
- vii. Transport network;
- viii. Water and Land Pollution;
- ix. Enforcement of By-Laws that do not meet the current food safety needs and challenges;
- x. Lack of proper monitoring mechanisms in place;
- xi. Lack of reliable data on food safety;
- xii. Lack of Public awareness on the importance of food safety and Hygiene.

ACKNOWLEDGEMENTS

The authors would like to acknowledge the support received from members of the Multistakeholder Task Team that resulted in the completion of this report. These are:

Asenic Hampungani	Forestry Department. Kitwe.
Benard Chibwana	National Aquaculture Research and Development Centre. Kitwe.
George Mulenga	National Traders and Marketeers Association of Zambia. Kitwe.
George Kangwa	Central Statistical Office. Kitwe.
Wilbroad Chongo	World Vision Zambia. Chingola.
Shilla C. Songolo	Kitwe City Council. Kitwe.
Mpenza Mwanza	Sustainable Agriculture Programme. Kitwe.
Cliff Ngwata	Zambia Environmental Management Agency. Ndola.
Chikafuna Banda	Kitwe District Health Board. Kitwe.
Benjamin Machuta	Nkana Water and Sewerage Company. Kitwe.
Teddy Chisenga	Department Community Development. Kitwe
Dorothy P. Chitundu	District Education Office. Kitwe.
Elias Banda	Amiran Zambia. Kitwe.
David Kasuba	Zambia National Farmers Union. Kalulushi.
Felix Chipoya	Kitwe District Land Alliance. Kitwe.

We would also like to thank the Kitwe City Council for the logistical support and guidance during the process of putting the report together; and FAO for providing the methodological framework and finances for the project.

ABBREVIATIONS AND ACRONYMS

ACC	Anti Corruption Commission
CVAA	Comprehensive Vulnerability Assessment Analysis
CBD	Central Business District
СВО	Community Based Organization
CBU	Copperbelt University
ССРС	Competition and Consumer Protection Commission
CEC	Copperbelt Energy Company
CFS	Crop Forecast Survey
CPI	Consumer Price Index
CRFS	City Region Food System
CSO	Central Statistical Office
DACO	District Agricultural Coordinator
DMMU	Disaster Management and Mitigation Unit
ERB	Energy Regulation Board
GDP	Gross Domestic Product
GNP	Gross National Product
GPS	Geographic Positioning System
GRZ	Government of the Republic of Zambia
ICT	Information and Communications Technology
EIA	Environmental Impact Assessment
FAO	Food and Agricultural Organization of the United Nations
FISP	Fertilizer Input Support Programme
FRA	Food Reserve Agency
FSDS	Food Supply and Distribution Systems
ibid	Latin, short for <i>ibidem</i> , meaning in the same place or source
ICT	Information and Communication Technology
IFPRI	International Food Policy Research Institute
IPCC	Inter-governmental Panel on Climate Change
IUCN	International Conservation Union
IWRM	Integrated Water Resources Management
КСС	Kitwe City Council
Kg	Kilogramme
LME	London Metal Exchange
MAM	Moderate Acute Malnutrition
MFL	Ministry of Fisheries and Livestock
МоА	Ministry of Agriculture
MT	Metric Ton
MTT	Multi-stakeholder Task Team
NATMAZ	National Traders and Marketeers Association of Zambia
NAPA	National Adaptation Programme of Action
NAPSA	National Pension and Savings Authority

NCCRS	National Climate Change Response Strategy
NEAP	National Environmental Action Plan
NEP	National Energy Policy
NGO	Non-Governmental Organisation
NWASCO	National Water Supply and Sanitation Council
NWSC	Nkana Water and Sewerage Company
PACRA	Patents and Companies Registration Agency
PHS	Post-Harvest Survey
PQPS	Plant Quarantine and Phytosanitary Service
R-SNDP	Revised Sixth National Development Plan
RSZ	Railways Systems of Zambia
SADC	Southern Africa Development Community
SAM	Severe Acute Malnutrition
SCCI	Seed Control and Certification Institute
UN	United Nations
UNDP	United Nations Development Programme
UNICEF	United Nations International Children's Education Fund
ZABS	Zambia Bureau of Standards
ZAMPOST	Zambia Postal Services Corporation
ZAMTEL	Zambia Telecommunication Corporation
ZESCO	Zambia Electricity Supply Corporation
ZNBC	Zambia National Broadcasting Corporation
ZNBS	Zambia National Building Society
ZNFU	Zambia National Farmers Union
ZRA	Zambia Revenue Authority
ZSIC	Zambia State Insurance Corporation
ZVA	Zambia Vulnerability Assessment

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1. INTRODUCTION

The Copperbelt province lies between latitude 12° to 13° 50′ South and longitude 27° to 29° East and is located on the north-western border of Zambia with the Democratic Republic of Congo (ACCC, 2010). It is a narrow strip of land extending from Chililabombwe in the North-West to Bwana Mkubwa in the South-East (Hampwaye, 2008). It covers an area of 31,328 square kilometer accounting for about 4.2% of the total area of Zambia (CSO, 2004). The ten main towns and districts on the Copperbelt province as shown in Figure: 2 include Chililabombwe, Chingola, Mufulira, Kitwe, Ndola, Luanshya, Lufwanyama, Kalulushi, Masaiti and Mpongwe. The Copperbelt province lies at an altitude ranging between 1,200m and 1,455m above sea level (Hampwaye, 2008). The Kafue River and its tributaries (Kafubu, Mulyashi and Luansobe) dissect this peneplain. Some of the headwaters of these rivers form a system of dambos.

Geologically, the Copperbelt lies on the Katanga rock system which is one of the World's greatest mineral bearing rocks, in particular for copper (Hampwaye, 2008). It is the distribution of these copper deposits which has been responsible for dictating the spatial pattern of development of the Copperbelt. The climate of the province is characterized by the high rainfall and humid rainy season, cool dry and hot season (Hampwaye, 2008). The average annual rainfall is around 1400 millimetre (CSO, 2004). Temperatures on the Copperbelt fall in range of 15°C in May/June to 32°C in October (ACCC, 2010).



Figure 1. Map of the Copperbelt province (Source: Luanshya Municipal Council, 2010)

Kitwe city lies between 12° and 13° South and 27° to 29° east and is the second largest city in Zambia located in the central part of the Copperbelt province (Chembo, 2009). The mean attitude of Kitwe is about 1295 meters above sea level while its total area is about 727km². Kitwe like the rest of the Copperbelt Province experiences wet and dry seasons. The extreme temperatures are between 29 °C and 32 °C normally experienced during the hot season while the minimum temperatures ranges from 9 to 14 °C.

Kitwe was founded in 1936 and attained city status in 1966. The district is located on a gentle sloping plain at an attitude of over 1295m above sea level The landscape around Kitwe is an attractive mix of gently undulating woodlands, dambos, farmland and rivers such as the Kafue River flowing along Kitwe's eastern and southern edges. The city covers an area of 777 Km².

2. DEFINITION OF THE KITWE CITY REGION FOOD SYSTEM

The Kitwe city region food system is classified as per Table 1.

City Region Classes	Geographic Description	Delimiting Factors
Primary (Core region)	Region within legally recognized administrative boundaries for Kitwe district	Any reference to Kitwe city region entails the <i>core</i> <i>region</i> . Classified based on the fact that Kitwe has the administrative responsibility to provide technical and logical support that will enable enhanced capacity for management of food waste and food production, distribution, storage and marketing. Reference to Kitwe city region food system entails the core region through to the tertiary region.
Secondary (Peripheral region)	Region excluding <i>core</i> and <i>tertiary region</i> but inclusive of all the surrounding districts with which Kitwe shares administrative boundaries and from which the Kitwe food system is supplied with agricultural produce, livestock and poultry products.	Recognized as an existing region that supplies agricultural products, livestock and poultry products is made up of Chambeshi, Kalulushi, Luanshya, Mufulira and Ndola. Kitwe is not able to provide technical and logistical support as the <i>secondary</i> <i>region</i> is outside the administrative jurisdiction of Kitwe city. However, Kitwe is able to advice through its interaction with regions in the <i>secondary region</i> through the Provincial Development Coordinating Committee meetings.
Tertiary (Other regions)	Region outside the <i>secondary region</i> but from which the Kitwe food system obtains agricultural, livestock and poultry products.	Recognized as an existing region that supplies agricultural products, livestock and poultry products is made up of any region outside that of Chambeshi, Kalulushi, Luanshya, Mufulira and Ndola. <i>Tertiary</i> <i>region</i> includes every source of food consumed, marketed and distributed within Kitwe but not produced in the <i>core region</i> nor the <i>secondary</i> <i>region</i> . Kitwe is not able to provide technical and logistical support as the <i>tertiary region</i> is outside the administrative jurisdiction of Kitwe city.

Table 1. Definition and categorisation of the Kitwe city region and food system

Regions outside the *core region* contribute to the food system of Kitwe. However, despite this classification, any reference to the Kitwe city region entails the *core region* unless mention of *secondary* or *tertiary region* is specifically mentioned as part of the Kitwe city region food system.

Criteria for the definition of the city region and city region food system are:

- 1. Administrative boundaries define the region of the city over which the Kitwe City Council has jurisdiction and whose by-laws are applicable within the city region;
- 2. City region food system is defined by based on:
 - a. Sources of processed and unprocessed agriculture, livestock and poultry products consumed, marketed or distributed within and outside the city region;

b. Potential to establish interventions in terms of producer capacity and improvement of infrastructure and facilities.

The areas of the food system are:

- 1. Input supply and production (crop, livestock and poultry);
- 2. Storage, processing and manufacturing;
- 3. Wholesale and distribution;
- 4. Consumption and nutrition;
- 5. Marketing, catering and distribution;
- 6. Food organic waste management.

Education, primarily agricultural extension, gender and health are crossing cutting issues even if education and gender have been included in Table 2.

The indicators that pertain to the Kitwe city food system include:

- 1. Improvement in health or wellbeing and social sustainability;
- 2. Increase in local and regional economic growth, jobs and agricultural viability;
- 3. Improved stewardship of environmental resources;
- 4. Improvement in land husbandry;
- 5. Facilitated social and ecological resilience to climate change and variability impacts;
- 6. Democratic engagement and education.

Areas of the food system are further discussed in the document together with their indicators and how they are linked. The distribution of farms is scattered throughout the core and peripheral region (Figure 1) and are closely linked to the road network and consumption nodes.



Figure 2. Location of farming areas, retail and markets in the core and peripheral region

Table 2. Factors that ensure that areas of the city food system are contributing to expected indicators

	Improve health/wellbeing &	Increase economic growth, jobs,	Improve stewardship of	Improve land	Facilitate social & ecological resilience to	Democratic engagement &
	social sustainability	agricultural viability	environmentarresources	nusbanury	climate change impacts	education
	1. Reduced	1. Household income	Adoption of sustainable	Knowledge and	Climate change	Government efforts
	Malnutrition levels	levels	agriculture practices	awareness	knowledge, awareness	towards policy and
Input supply &	2. Increased	2. Crop yield			and adaption	implementation
production	Household food	3. Employment level				
	security					
	3. Supply chain					
	1. Infrastructure	1. Household income	1. Standards in waste	Planning, usage and	Climate change	1. Govt efforts
Storage,	2. Labour	levels	management	compliance to land use	knowledge, awareness	towards policy and
processing &	3. Hygiene in the	2. Crop yield	2. Food processing	standards	and adoption	implementation
manufacturing	value chain	3. Employment level	dynamics			2. Level of
	4. Value addition	4. Utilization				compliance
Wholesale &	Infrastructure	1. Income	1. Standards in waste	Improved	Adaption measures to	Policy engagement
distribution		2. Infrastructure dev	management	management of land	climate change	
alstribution			2. Recycling	use		
Consumption &	1. Household food	Health work force	Amount of waste	Land use-areas under	Knowledge and	Policy adherence
nutrition	security		generated	cultivation and use	awareness	
natintion	2. Nutritional status					
Marketing	1. Beneficiaries in	1. Job creation	Enhanced investment in	1. Easy access to food	1. Improved packaging &	1. Policy
catering &	the value chain	2. More traders &	environmental	2. Infrastructure	sorting	harmonization
distribution	2. Satisfied	outlets	management &	development	2. Infrastructure	2. Level of
	consumers		compliance		development	compliance
	Improved health	1. Income improved	1. Improved crop yields	Reduced land	1. Reduced	Formulation &
Food & organic		2. Jobs created	2. Improved sanitation	degradation e.g.	contamination of water	review of policies
waste		3. Improved crop	3. Improved organic food	corrosion,	2. Reduced carbon	and by laws
management		yield	production	deforestation	emission	
			4. Low input cost			

	5. Availability healthier		
	organically produced		
	food		

	Improve health/wellbeing & social sustainability	Increase economic growth, jobs, agricultural viability	Improve stewardship of environmental resources	Improve land husbandry	Facilitate social & ecological resilience to climate change impacts	Democratic engagement & education
Food & agricultural policy	 Improved health Improved nutrition Improved living standards 	 Job creation, High agricultural productivity Increased manufacturing of food 	 Level of adoption with regard to conservation farming Lower carbon emission 	 Improved soil fertility Increase animal productivity 	 Improved drought tolerant crops Reduced water land contamination 	 Well informed farmers on good agricultural practices. Better allocation of resources on agriculture sector
Democratic governance	Better allocation of resources	Better economic policies, & allocation of resources to agriculture sector	Better compliance towards environmental regulation	Improved policies & management related to land	Reduced land and water contamination	Population have knowledge on participation in politics
Education	Improved sanitation	Availability of skilled manpower	Skilled people to manage natural resources	Improved land management	 Sustainable use of resources Skilled people to manage natural resources 	Increased community participation in management of resources
Gender	Equitable sharing of roles & responsibilities	Improved women participation in economic activities	Improved stewardship in management of environmental resources by both sex	Improved land management	Improved sustainable resources management by both sexes	Improved women participation in policy making both at central and local level

3. STAKEHOLDERS MAPPING

3.1. METHODOLOGY

The first stage of stakeholder mapping started with consultation with the Kitwe City Council regarding the procedure for the process and the contact person within the Kitwe City Council. A list of stakeholders was developed through the following categorisation:

- 1. Direct participants in the food value chain: Corporate entities, civil society, traders and producer representatives that provide technical services and inputs to farmers;
- 2. Organisations that provide awareness and communication: farmer organisations and other civil society organizations;
- 3. Institutions and organisations that formulate, influence and implement policies and legislation: the Kitwe City Council and government entities such as the Ministry of Agriculture and Cooperatives;
- 4. Institutions and organisations that have advisory roles: academia and research institutes;
- 5. Elected officials: the elected officials within the CRFS are several and from different political persuasions. These officials, ward Councillors, constitute the management council of each of the municipal governments within the CRFS. In order to avoid politicising this process, and maintain representation, only the District Agricultural Coordinators for each district of the Copperbelt Province were included as they were in charge of managing the agricultural sector and are the senior public servants in the district public service.

Even though the CRFS categories were defined, they have no definite boundaries in terms of some of the roles of stakeholders in the food system as well as the movement of food, information and skills within the CRFS. For example, the Zambia National Farmers Union is covered under categories 1 and 2 but its jurisdiction covers the region outside the peripheral region.

The main stakeholders had been then listed and described in Table 3.

Table 3. Stakeholders in the Kitwe city region and city region food system

Category	Name of Stakeholder	Short Description	Location	Role in the food system
Agro input	i. Vinco Limited	Companies working in Farming, Agricultural	Kitwe	Supply agricultural inputs such as farm
suppliers/traders	ii. Swinney	supplies, Agriculture, Industrial services		equipment, tools, seed, chemicals &
	iii. Ria	business activities		technical services
	iv. Amiran	See more at:		
	v. Technoserve	www.seedco.co.zm;		
Seed suppliers	i. Seedco	www.technoserve.org/our-work/where-we-		
	ii. Zamseed	work/country/zambia;		
	iii. MRI	www.asti.cgiar.org/node/847;		
		www.mriseed.com;		
Civil society	NATMAZ	National Traders & Marketers Association of	Kitwe (except	Assists traders & marketers on how to
		Zambia is an organisation that represents the	ZNFU which is	store their merchandise; provides
		interest of traders & marketers.	located in	information on markets to traders &
			Kalulushi)	marketers.
	Sustainable Agriculture	Local civil society		Provides technical support to farmers.
	Programme (SAP)			
	Kitwe District Land Alliance	The Zambia Land Alliance (ZLA) was		Provides advisory services to farmers
	(KDLA)	established in 1997 as a response to the		regarding issues related to land rights,
		government of Zambia's land reform process		education; sensitization & advocating
		of the 1990s. Today ZLA is a network of NGOs		for pro-poor land policies; planning to
		promoting fair land policies, laws and land		cater for small scale farmers.
		administration which take into account the		
		needs of the poor.		
		http://www.zla.org.zm/		
	World Vision	International civil society.		Provides inputs & technical services to
				resource poor farmers; minimal capital
				credits

	Zambia National Farmers Union (ZNFU)	Zambia National Farmers Union (ZNFU) is a national membership based organization, with countrywide coverage, representing the agriculture industry (small and large scale farmers and agribusinesses. The member are currently categorized into: District Famers' Association; Commodity specialized		Provides technical & advisory services to cooperatives & individual farmers on all aspects of farming: inputs, capital, markets, crop selection & production, farm management
		associations; Corporate Farming businesses; The Agribusiness chamber; Association members. <u>http://www.znfu.org.zm/</u>		
Government departments	Central Statistical Office	Tasked with the collection of data on the food system. <u>www.zamstats.gov.zm</u>	Kitwe	Provides statistics on the food system to policy makers that is used to manage & improve the food system.
	Community Development	Tasked with providing community development support to local communities.		Unknown
	Forestry	Attain sustainable forest management of all types of forests to enhance forest products and services, contributing to mitigation of climate change, income generation, poverty reduction, job creation and protection and maintenance of biodiversity. <u>www.ministryoflands.gov.zm</u>		Roles include facilitation in extension programs; offer policy guidance on land and forestry management & promotion of sustainable livelihood programs
	Agriculture	District agriculture office is mandated to manage the agricultural sector in Zambia in line with government policies on agriculture and the Revised Sixth National Development Plan. <u>www.agriculture.gov.zm</u>		Increased agricultural production, sector liberalization, commercialization, promotion of public and private partnerships; strengthen & expand emerging opportunities; deal

				with challenges facing the agricultural sector.
	Kitwe District Education Board	Mandated to promote good health and nutrition in Schools and communities; Educating our Future (1996); School Health and Nutrition Policy (SHN). District level structure under Ministry of General Education. The district education office is responsible for the management of all basic schools within its coverage. The preparation and submission of the operational annual work plans and budgets, processing staff and pupils' disciplinary cases, monitoring education facilities as well as attending to staff welfare are among the responsibilities of the district education office (GRZ, 2007). www.moe.gov.zm.		Training of community members; Sensitization; Scaling up of Production units in school in order to contribute to CRFS; Areas of interventions: school feeding programs through production units though with financial difficulties Enhanced production units to supply the city with adequate funding
	Zambia Environmental Management Agency (ZEMA)	ZEMA is the environmental management watchdog of the government. Even though it has overall oversight on environmental management including EIA, it has been known to focus much more on mining and mining	Ndola	Protects the food value chain and its actors from producing, distributing and consuming food that may have originated from a polluted environment; regulates the level of
		operations by virtue of the pollution impact that the sector has. <u>www.zema.org.zm</u>		impact on land, air and water.
	Nkana Water & Sewerage Services Company (NWSC)	Supplies water and sewerage services to residents and industries in Kitwe.	Kitwe	Ensures that water supplied to households and other industrial facilities is of good quality.
Local government	Kitwe City Council (KCC)	Local authority with civil jurisdiction over the district of Kitwe. KCC becomes the head of government under decentralization in 2016.	Kitwe (supervisory/over sight)	Provide social services & infrastructure within the city of Kitwe; legislate & implement by-laws that ensures sustainable economic development,

		www.kcc.gov.zm and the district agriculture		health and safety of the citizens of
		office will be the first public office to report		Kitwe. Provide land for agriculture
		directly to the city council.		development, develop & manage
				markets, manage waste.
Research Institutes	National Aquaculture	Research centre tasked with research in	Mwekera, Kitwe	Provides fingerlings, training &
	Research & Development	aquaculture.		technical advice to farmers & other
	Centre (NARDC)			institutions.
Academia	Copperbelt University	Public institution established to provide	Kitwe	Trains students in agroforestry, urban
		tertiary education, research & community		& regional planning, and forestry.
		services. <u>www.cbu.edu.zm</u>		

NB. Stakeholders marked in red have not provided the information required to complete the table

3.2. STAKEHOLDER ROLES AND RESPONSIBILITIES IN THE KITWE CITY REGION FOOD SYSTEM

The stakeholders that have so far provided the initial information on their role in food production, marketing, storage and distribution; responsibilities (Table 4) in the food system and collaborative framework are:

- i. Government: Agriculture, Forestry, National Agriculture Research and Development Centre;
- ii. Civil Society: Kitwe District Land Alliance (KDLA), National Traders and Marketers Association of Zambia (NATMAZ), World Vision Zambia, Sustainable Agriculture Programme (SAP), Zambia National Farmers Union (ZNFU);
- iii. University: Copperbelt University.

The process is continuous and Amiran, Central Statistical Services, Department of Community Development, Nkana Water and Sewerage Service (NWSS), Seedco, Sustainable Agriculture Programme, World Vision and the Zambia Environmental Management Agency (ZEMA) are yet to submit the required information to finalise Table 4.

Table 4. Stakeholder roles, responsibilities and collaborative framework

Stakeholder	Role in food production, marketing, consumption,	Responsibilities / Obligations	Collaborators
	nutrition, storage & distribution		
Kitwe District Education	Training of community members; sensitization ;	Mandated to promote good health	Ministry of Agriculture for technical support
Board	scaling up of production units in school in order	and nutrition in Schools and	and provide technical training, inputs in
	to contribute to CRFS.	communities through	agriculture production and nutrition; NGOs,
		implementation of various policies	CBOs and community agents involved in
		including Educating our Future (1996)	nutrition and food production programs.
		& School Health and Nutrition Policy	
		(SHN).	
Kitwe District	Monitoring aspects related to nutrition of	To effectively and efficiently facilitate	KCC, ZPCTII, JSI, WHO, UNICEF, CSO,
Community Health	children and pregnant mothers; provision of	provision of equitable social	Ministry of Education, and CHAZ.
Office	food packs to HIV & AIDS, TB & pregnant women	protection and quality primary health	
	from poor households.	care services to communities in order	
		to contribute to sustainable human	
		development; & to provide equity of	
		access to cost effective, quality	
		healthcare as close to the family as	
		possible.	
District Agricultural	National policy & legislation formulation,	Farmer support.	Rural & urban producers, crop marketers,
Office	technical service provider, assessment of		financial & training institutions, other
	production.		government depts., civil society
			organisations, international organizations.
Kitwe City Council (KCC)	Local development & social policy & legislation	Provision of a conducive city service,	Local community organisations, civil society,
	formulation, management of the city, logistics,	infrastructure & environment for the	national government, private sector,
	markets establishment & management,	healthy & secure production,	farmers unions, marketeers, farmers, food
	wholesale & retail businesses management,	movement, marketing, storage &	distributors, wholesalers & retailers,
	issuance of manufacturing & trading licences.	consumption of food stuff.	financial & training institutions.

Forestry (District &	National policy & legislation formulation,	Ensuring that food production & the	Government (national & local), civil society
Research offices)	technical service provider, issuance of licenses to	conservation of the environment	organisations, private sector, financial &
	collect non-timber forest products, analysis of	exist in harmony.	training institutions, local communities,
	soil.		traditional leadership.
National Aquaculture	Provision of and research in the production of	Provide aquaculture support &	Zambia Agriculture Research Institute,
Research &	quality fingerlings & table size fish.	facilities to fish farmers.	National Science & Technology Centre,
Development Centre			Kalimba Farms.
(NARDC)			
Sustainable Agriculture	Provision of agriculture extension to smallholder	Coordinate programme; linkages with	Kitwe District Land Alliance (KDLA), Zambia
Programme (SAP)	farmers; input support on various crops; market	other stakeholders.	National Farmers Union, Ministry of
	linkages with government & private sector;		Agriculture, Community Development,
	capacity building to contribute to smallholder		Private sector.
	farmers enhancement of knowledge i.e. training,		
	exposure learning visits, field days; facilitate		
	storage shed management; promotion of value		
	chain system.		
World Vision Zambia	Production: community mobilization into	Facilitation of community	KCC, DACO, ZNFU, financial institutions,
	producer groups (PGs); linkages of PGs to	mobilization into production	local communities, farmer cooperatives.
	technical services to enhance improved	structure; linkage for market access;	
	production levels & productivity; on-farm & off-	provision of value chain financing;	
	farm natural resources management to enhance	advocacy for a safer food system.	
	resilience to production shocks.		
	Marketing/distribution.		
Kitwe District Land	Advocacy related to issues of land policy,	Sustainability of food.	SAP, DEGHA, ASAYI, CARITAS, members of
Alliance	legislation, ownership and conflict.		the local community.
National Traders and	Represent rights and freedoms of marketeers	Ensure the safe storage of food.	KCC, ZEMA, local community, SAP, ZNFU.
Marketeers Association	and traders in Zambia.		
(NATMAZ)			

Zambia National Farmers Union (ZNFU)	 Ensure farmers produce food for domestic consumption & for sale; Find markets where food can be sold at a reasonable price to ensure profitability; Ensure that farmers do not sell all their produce but store part of the produce to prevent hunger among farmers; Ensure farmers have access to markets while at the farm using a facility on the mobile phone (Airtel & Cell Z) allowing the farmer to select the best market 	 Represent the interest of farmers to government; Provide financial loans to farmers working in collaboration with ZANACO and NATSAVE banks. 	ZANACO Bank, NATSAVE and companies producing and retailing farm inputs such as Saro, Camco.
Zambia Environmental Management Agency	Provides environmental management safeguards at various levels of the food chain.	Mandate: Environmental Management, Protection and Pollution Control. Current Policies: National Policy on Environment, National Waste Management Strategy, Sector Specific policies (eg the National Waste and Sanitation Policy). Streamlining environmental management in national planning through the requirement for the need for government departments and Ministries to conduct strategic environmental assessments for all programmes, plans and policies that	All public and private organisations & institutions.

3.3. STAKEHOLDER ANALYSIS

The collaborative framework (Table 4 and Figure 4) in the Kitwe CRFS shows an interaction amongst the key players in the food system such as government, civil society and research institutes. This may be indicative of common interest and internal agricultural system strengths that are buttressed by the network. Additionally, the characteristics of the network partly validates institutional mandates related to the food system. However, only the KCC and ZNFU show interrelationships with local communities in which resource poor and vulnerable producers live.





Green circles = civil society organisations; black circles = national government departments; red triangles = financial institutions; blue diamonds = private sector; blue square = kitwe city council. (kdla=kitwe district land alliance; kcc=kitwe city council; sap=sustainable agriculture programme; nardc=national agricultural research & development centre; nstc=national science & technology centre) prepared using socnetv 1.9.

In terms of Figure 3, it is apparent that organizations or institutions with the largest links are CBU, KCC and ZNFU followed by KDLA and NARDC. It is apparent that CBU, KCC and ZNFU are service organizations and institutions. Interestingly, all three by virtue of their operations have a significant role in the food system such as training, research and community service (CBU), policy and management of components of the food system (KCC) and provision of technical services to farmers (ZNFU). The second category of stakeholders with the most linkages provide technical advisory services in the context of research and land. Conceptually, the network shows complementarity when organizations and institutions are viewed from a functional perspective and not a normative perspective.

An analysis of the roles of the stakeholders shows that they can be grouped in governance, management and support categories. Stakeholders with a governance function in the Kitwe food value chain (from production to consumption) include the Kitwe District Council, District Agricultural Office, Zambia Environmental Management Agency and other government departments. However, the roles of KCC and District Agriculture cut across the whole food value chain. The support category is where most of the remaining stakeholders fall, with the exception that advocacy groups such as KDLA can play a significant role in governance and management of the food system as they can provide checks and balances.

A missing link that has been accepted by the MTT, is the omission of political players outside the jurisdiction of the Kitwe city. Based on the classification of the Kitwe city region food system, chairpersons or District Agricultural Coordinators (DACO) from the peripheral region of the food system will be consulted and included as part of the Kitwe city region food system. These chair Council meetings that are attended by elected officials from wards in each district.

Another notable absence from the stakeholder and network analysis, is the representation of women or women groups. It is assumed that the MTT is a collection of key stakeholders that represent government, civil society/NGOs, research institutes, local authorities and academia. All of these stakeholders represent various interests including gender. The MTT has however included gender as a key element in developing indicators that relate to each of the Kitwe food system areas. Women remain an important element in the Kitwe food system based on the role they play in food production, transportation, processing and marketing. Additionally, they are more affected by food insecurity together with children in comparison to men.

KCC, district agriculture and ZNFU can be classified as being pivotal stakeholders according on the basis of their pivotal role in the governance and management of the Kitwe food system. Kitwe does not seem to have emerging cadre of stakeholders compared to Lusaka. However, international NGOs, dealing primarily in livelihoods, constitute the most likely emerging group of stakeholders.
4. NATIONAL POLICY AND LEGAL FRAMEWORK

4.1. NATIONAL DEVELOPMENT FRAMEWORK

Zambia has a population is about 13 million (ibid.) with an estimated land area of about 750 thousand square kilometers. The country's development framework strategies are anchored in the Vision 2030 (GRZ, 2006) and Revised National Development Plan 2013-2016 (R-SNDP) (GRZ, 2014). Development strategies in the Vision 2030 and the R-SNDP are in Table 5.

Policy document	Vision 2030 (ibid.) - <i>to be a prosperous middle-income</i> nation	R-SNDP 2013-2016 (ibid.)
		The strategic focus of the R-SNDP is, therefore, to address the low levels of employment in the economy, invest in rural development and reduce widening inequalities in the economy
Strategies	 a) Improve access to affordable credit and other financial services as well as the development of capital markets in both rural and urban areas, for both men and women; b) Provide an effective financial framework that guides operations of banks and non-bank financial institutions that will ensure improved market data, accounting and auditing standards; c) Streamline work permit and licence requirements and procedures, improve access to land by both men and women, and improve the performance of key government agencies servicing private investors, as well as improve tax and customs administration procedures; d) Improve regulation, supervision and enforcement of statutory commitments in the mining sector, particularly gem stone mining, to strengthen tracking of potential investors and improve the efficiency of the system of logging, dissemination of information on available plots for mining and recording of commercial mining activities; e) Facilitate the establishment of a private sector led gem exchange to foster the creation of a fair value marketing system and relieve constraints in the supply chain; f) Encourage skills training, technology diffusion and use, in an environmentally friendly manner; 	a) Infrastructure development b) Employment and Job creation c) Rural development d) Human development

Table 5. Development aspirations and strategies in the Vision 2030 and R-SNDP 2013-2016

	g) Develop and maintain productive and social	
	infrastructure and services such as roads; storage	
	facilities, rail network, energy, communications systems,	
	education, training and health facilities, public utilities	
	and other services;	
	h) Improve access to information in order to promote	
	citizenry participation in socioeconomic development.	
Priority		a) agriculture, livestock
sectors /		and fisheries
growth areas		b) manufacturing
		c) energy
		d) construction
		e) tourism
		f) mining

The country, located in Southern Africa, is one of the world's poorest countries with more than 50% of the population living in extreme poverty while 67% of the rural population lives in extreme poverty (UNDP, 2011).

The proportion of the population who live below the poverty line in 2010 was 60.5% compared to 62.8% in 2006 (CSO, 2012). Zambia's rural population remained predominantly poor with overall poverty levels at 77.9% as compared to their urban counterparts at 27.5% in 2010. In 2006, 80.3% in rural areas lived below the poverty line, while 29.7% in urban areas lived below the poverty line. Poverty amongst small scale farmers declined from 81.5% in 2006 to 79.9% in 2010. In urban areas, the residents in low cost residential areas had the highest incidence of aggregate poverty at 34.5%, followed by medium cost residential areas 8.8%, while the high cost residential areas had the lowest incidence at 4.9% in 2010. Levels of extreme poverty have continued to remain high especially in the predominantly rural Luapula, Western, Eastern and Northern Provinces in both years. Unlike the other regions, results show a sharp increase in extreme poverty in Luapula Province between 2006 and 2010, from 53.6% to 64.9%. Eastern and Lusaka Provinces also recorded some marginal increase in extreme poverty. The rest of the regions revealed declines in levels of extreme poverty, particularly Central Province, followed by Southern Province. In 2010, female headed households had a 62.4% incidence of poverty, while male headed households had 60.1% poverty levels.

Some of the strategies in the R-SNDP have been formulated based on the fact that:

- 1. 51% of Zambia's population lives in extreme poverty with 67% of extremely poor people living in rural areas;
- 2. Economic growth is driven by capital-intensive sectors, such as mining, and has limited impact on community welfare;
- 3. Interest rates are high as is domestic debt;
- 4. High inflation rate above 7%. Current estimates of annual rate of inflation (CPI) is 19.5%, annual food is 23.4% and annual non-food inflation rate is 15.5% (CSO, 2015). Food and non-alcoholic beverages have in 2015 contributed an average of 5% between from January to November 2015.

The Zambian economy is strongly dependent on the production of copper. Diversification of the economy is therefore one of the key aims of the Zambian government, which is also reflected in the Poverty Reduction Strategy, which was adopted in May 2002, and the R-SNDP. In attempting to arrest and reverse economic decline, Government implemented a sweeping programme of liberalization and deregulation in the 1990's, eliminating most major market distortions. However, commitment to reform weakened in the mid to late nineties when macroeconomic stabilization led to an initial contraction (UNDP, 2011).

In terms of agriculture, which has been prioritised as the most important sector, the R-SNDP 2013-2016 indicates that more than 50% of Zambia's population is employed the agriculture sector and therefore, agriculture development is critical for achieving inclusive growth and poverty reduction. The challenges that have been targeted in order to transform the sector include:

- 1. Unbalanced agriculture policies which have favoured maize production and disadvantaged the production of other crops;
- 2. Inadequate utilisation of research and development, farm mechanisation, science and technology and ICT to increase yields and maximise the comparative advantage of different areas of the country and access production and market information;
- 3. Poor storage, inadequate irrigation and other infrastructure challenges have resulted in postharvest wastages and over-reliance on rain-fed agriculture.

Government aims at promoting and enhancing crop diversification from maize to other crops such as soya beans, wheat, rice, cashew nuts, beans, cotton, groundnuts, coffee, tea, oil crops and tubers. In addition, measures will be undertaken to increase the area under irrigation, increase area planted through development of farm blocks, enhance productivity through expansion and decentralisation of research and extension services, promote the utilisation of improved seed varieties and other improved agricultural technologies, and promote farm mechanisation.

In the livestock sub-sector, the focus will be to increase livestock numbers through the establishment of livestock breeding centres, promotion of artificial insemination, construction of dams and canals to support agriculture production and establishment of milk collection centres. Priority will also be put on infrastructure development and rehabilitation, enhancing livestock disease control including compulsory dipping, surveillance and research, developing livestock standards and grades, and promoting processing of livestock and livestock products.

In the fisheries sub-sector, the strategic focus will be on development of smallholder aquaculture and improvement of infrastructure for fisheries research and marketing as well as promoting comanagement of capture fisheries in natural water bodies to ensure sustainability of fisheries resources.

Additional measures to support above strategies in agriculture include improving access to finance especially in rural areas and promoting guaranteed security on land tenure as collateral for small scale farmers to access finance for productive assets, technology and other inputs.

4.2. ENVIRONMENT AND NATURAL RESOURCES POLICIES AND LEGAL FRAMEWORK

The environment and natural resources sector is government by the followings:

Environmental Management Act No. 12 of 2011

Preparation of the state of the environment Report; environmental management strategies and other plans for environmental and sustainable development; strategic environmental assessments of proposed policies, plans and programmes likely to have an impact on the environment; provide for prevention and control of pollution and environmental degradation; provide for public participation in environmental decision making and access to environmental information; superintend over environmental impact assessments (EIA); provide for environmental audit and monitoring; facilitate implementation of international environmental agreements and conventions to which Zambia is a party.

Fisheries Policy of 2015 (Draft) and the Fisheries Amendment Act No. 22 of 2007

Declaration of fisheries management areas; restriction on fishing in fisheries management area; appointment of fisheries management committees; prohibition of aquaculture without a license; requirements to conduct environmental impact assessment; requirement to conduct environmental impact assessment; restriction on use of chemicals in aquaculture.

Forest Policy of 2015 and Forest Act of 2015.

Establishment and declaration of protected forests, joint forest management areas, botanical reserves, private and community forests; provide for participation of local communities, local authorities, traditional institutions, NGOs and other stakeholders in sustainable forest management; provide for conservation and use of forests ecosystems and biodiversity; and provide for the implementation of international environmental conventions and relevant international agreements to which Zambia is a party.

National Policy on Environment of 2007

Promote sound protection and management of the environment and natural resources in their entirety, balancing socio-economic development and environmental integrity; manage the environment by linking together activities, interests and perspectives of all, NGOs and government; accelerate environmentally and economically sustainable growth to improve human health, sustainable livelihoods, income and the poor; ensure broad based environmental awareness and commitment to enforce environmental laws and promotion of environmental accountability; build individual and institutional capacity to sustain environment; regulate and enforce environmental laws; promote development of sustainable industrial and commercial processes having full regard for environmental integrity.

Policy for National Parks and Wildlife in Zambia of 1998 and Zambia Wildlife Act of 1998

Conservation of watersheds, historical, areas of outstanding scenic qualities such as dramatic topographic features, unusual contrasts in landforms or vegetation, spectacular views, or other special landscape features; site that is an invaluable ecological or geological benchmark due to an extensive and long-term record of research and scientific discovery; water and soil resources critical to maintaining ecological integrity and to support the subsistence need of local communities.

4.3. ENERGY POLICY AND LEGISLATION

4.3.1. National energy policy and institutional framework

The department responsible for energy aims to contribute to the conservation of forests and sustainable management of charcoal and firewood production. This is stated in the objective under 5.2 of the National Energy Policy (NEP) of 2008 as *"This policy seeks to ensure environmentally sustainable exploitation of the biomass resource by ensuring efficiency through better management and introduction of new technologies i.e. bio fuels and gel fuel"*. In additional, 5.2.2.1 (c) of the NEP aims to promote appropriate alternatives to firewood and reduce its consumption through: i) encouraging the use of kerosene, liquefied petroleum gas and millennium gel as a household fuel; and ii) encouraging the use of alternative fuel for agricultural activities, such as flue-cured tobacco. Corollary to the above stipulations, additional policy measures (section 5.2.2.1) supportive of biomass energy are:

- 1. Sustainable management of woodlands and forests as sustainable sources of wood fuel
 - (a). Encouraging the establishment of forest plantations/wood lots in current or future wood deficit areas;
 - (b). Effective regulation of the wood fuel sector;
- 2. Encourage utilisation of agro, forest and sawmill residues for combustion and gasification through;
 - (a). The growing of woodlots; and
 - (b). Promoting biomass combustion and gasification technologies.

The National Energy Policy is formulated and enforced by the government ministry responsible for energy while the infrastructure is the responsibility of the Zambia Electricity Supply Corporation (ZESCO) which is a state owned enterprise and the privately owned Copperbelt Energy Company (CEC) located on the Copperbelt Province. Current policies emphasise the need to expand power generation capacity and delivery infrastructure. The Energy Regulations Board (ERB) has the mandate for energy policy in Zambia according to the Energy Regulation Act Cap. 436 of 1995. ERB monitors levels and structures of competition and pricing within the energy sector. This is carried out to promote competition and accessibility to companies, "in conjunction with other Government agencies, formulate measures to minimize the environmental impact of the production and supply of energy" and make recommendations to the Minister for regulations under the Act. In addition to the Energy Regulation Act, the National Energy Policy of 2008 recognizes all sources of energy, including biomass, hydro, biogas and renewable sources as well as the need for fiscal incentives and smart subsidies to enable them.

4.3.2. Other key policies relevant to forest management and energy

The indirect impact on energy of some of the policies in other sectors is through their provision of incentives that can lead to environmental degradation. Some of these policies are analysed in Table 6.

Policy and/or legislation	Description	Implementing institution
National Adaptation Programme of Action (NAPA), 2007	Evaluates the likely impacts of climate change on relevant sectors in Zambia and uses a multi-criteria analysis to rank the most urgent needs identified in order to generate a prioritized list of ten adaptation interventions. The following NAPA priorities identified are relevant to biomass energy: i) promoting alternatives sources of livelihoods; ii) managing critical habitats; and iii) promoting natural regeneration of indigenous forests.	Ministry of Lands, Natural Resources and Environmental Protection
Zambia Development Agency Act of 2006	Provides a legal framework for investment in Zambia. This is considered a top priority act and often results in conversion of large pieces of land to industrial development.	Zambia Development Agency
Mines and Minerals Development Act, 2008	Makes provision with respect to prospecting for and mining of minerals. It is indirectly behind most of the drivers of conversion of agriculture and forest land to industrial and urban development.	Ministry of Mines and Mineral Resources
National Environmental Action Plan (NEAP), 1994	Provides an overview of: i) the county's environmental problems; ii) existing legislation and institutions; and iii) strategy options for improving environmental quality. Environmental problems identified include soil degradation, deforestation and air pollution.	Ministry of Mines and Mineral Resources
National Agricultural Policy, 2005	Facilitates and supports the development of a sustainable and competitive agricultural sector that ensures food security at national and households levels and maximizes the sector's contribution to GNP. Sector policies and objectives include: i) food security; ii) contribution to industrial development; iii) income and employment; and iv) sustaining the natural resource base.	Ministry of Agriculture and Cooperatives
National Biodiversity Strategy and Action Plan, 1999	The plan also aims to improve the legal and institutional framework and human resources to implement the strategies for: i) conservation; ii) sustainable use; and iii) equitable sharing of benefits from biodiversity.	Ministry of Mines and Mineral Resources
Zambia National Action Plan for Combating Desertification, 2002	Aims to contribute to sustainable environmental management through the reduction/control of land degradation thereby contributing to poverty reduction, food self-sufficiency, and ultimately contributing to economic growth.	Ministry of Mines and Natural Resources

Table 6. Sector policies and legislation relevant to biomass energy

4.4. LAND POLICY AND LEGAL FRAMEWORK

The lands sector in Zambia does not have a written policy statement like other sectors. It is however governed by the Lands Acts No. 29 of 1995. Legally, land in Zambia is divided into two categories, state and customary land with 94% of the country's land under customary tenure (Chileshe, 2005; Muleya, 2006). The state division allows for lease holding for a period of 99 years whereas customary tenure does not provide secure tenure even though the legislation recognises rights of customary i.e. Notwithstanding section thirty-two, the rights and privileges of any person to hold land under customary tenure shall be recognised and any such holding under the customary law applicable to the area in which a person has settled or intends to settle shall not be construed as an infringement of any provision of this Act or any other law except for a right or obligation which may arise under any other law. Land under customary tenure can be converted to leasehold...... any person who holds land under customary tenure may convert it into a leasehold tenure not exceeding ninety-nine years on application, in the manner prescribed, by way of-Conversion of customary tenure into leasehold tenure [...] and [...] Except for a right which may arise under any other law in Zambia, no title, other than a right to the use and occupation of any land under customary tenure claimed by a person, shall be valid unless it has been confirmed by the chief, and a lease granted by, the President. In order to avoid resolve conflicts over land ownership, the legislation establishes the Lands Tribunal whose terms of reference are:

- a) Inquire into and make awards and decisions in any dispute relating to land under this Act;
- b) To inquire into, and make awards and decisions relating to any dispute of compensation to be paid under this Act;
- c) Generally to inquire and adjudicate upon any matter affecting the land rights and obligations, under this Act, of any person or the Government; and
- d) To perform such acts and carry out such duties as may be prescribed under this Act or any other written law. Jurisdiction of Tribunal.

Land under customary tenure does not however provide the land holder with exclusive rights over the land as the land belongs to the community. This is land that a large number of small producers use to produce and supply agricultural products to Kitwe. The key challenge with customary land tenure is security of tenure. In this tenure regime, Chileshe (2005) and Mudenda (2006) argues that the lack of legal title in customary lands brings about tenure insecurity as rights of land holders are not recognised and protected by the state. The perception of traditional leaders and their subjects is that communal resources are important social safety nets that provide residents with equal access to the resources.

Despite the existence of legislation for land, conflicts have arisen (Mudenda, 2006):

- a) Conflicts between customary and private rights holders. There have been evictions and displacements resulting in the loss of livelihoods such as farmlands and in some cases crops, as well as loss of access to common pool resources;
- b) Conflicts in land allocation. Large tracts of land are allocated for conversion to private ownership, resulting in loss of access to resources especially the poor who benefit from the socalled secondary rights (access to natural resources), as it is one of the few ways to get food and necessary items to live;

c) Boundary conflicts. Land boundaries are not usually an issue when land for settlement and agriculture is in abundance relative to the need for land. However, urban-customary and chiefdom disputes occur aside from international boundary disputes. There have been situations when traditional leaders have complained of unclear boundaries between municipal and customary land. Civil society has accused the state and local government authorities of encroachment into customary land and called for clear demarcations or boundaries. Disputes between traditional leaders have also arisen where complaints related to clarity in boundaries between chiefs have led to disagreements due to either outdated or lack of maps.

Individual access to land under customary tenure has provided a basis for benefits from agriculture production. Given the decline in copper prices and the likely job losses on the Copperbelt Province, and Kitwe in particular, there is likely to be further demand for land for settlement and agriculture. The bulk of this land will be under customary tenure as the jobless cannot afford to purchase land under leasehold. The increase in joblessness and population, the demand for land is likely to increase. Despite the fact that people can access customary land at minimal cost now does not guarantee perpetual availability and tenure security. Therefore, promoting greater access and security in customary tenure is a requirement. This requires that boundaries are clarified, maintained and access to land especially for the poor is made much easier and cheaper.

4.5. AGRICULTURE POLICY AND LEGISLATION

The National Agricultural Policy 2004-2015 addresses issues of addresses sectoral strategies such as markets and private sector investments, agricultural production and utilization, provision of agricultural services, accessibility of land for agriculture and development of infrastructure in potentially productive areas, appropriate technology, gender equity in resource allocation and access to agricultural services, sustainable and environmentally sound agriculture practices, prevention and control of pests, crop and livestock diseases, conservation of fisheries resources, emergency preparedness, promoting and strengthening cooperatives and farmer organisations, promotion of irrigation development, incentives for local and foreign investments in agriculture, information collection and dissemination, maintaining biodiversity and promoting conservation of aquatic ecosystems and sustainable utilisation of natural resources.

The specific objectives of the policy are:

- a) Ensure national and household food security through an all year round production and postharvest management of adequate supplies of basic foodstuffs at competitive costs;
- b) Contribute to sustainable industrial development by providing local produced agro-based raw materials;
- c) Increase agricultural exports thereby enhancing the sector's contribution to national balance of payments;
- d) Generate income and employment through increased agriculture production and productivity;
- e) Ensure that existing agricultural resource base is maintained and improved upon.

The agriculture sub-sector objectives are presented in Table 7.

Table 7. National agriculture sub-sector objectives and strategies

Sub-sector	Main section of sub-sector	Overall objective
Crops	Crops Extension	Provide efficient and effective crops extension and technical service, especially through participatory
		approaches, to assist farmers increase agricultural production and productivity and diversify crop
		production and utilization.
	Agricultural Seed	Ensure that quality seed of various crops is made available to farmers in an efficient and convenient
		manner to ensure increased agricultural production
	Soils and Crops Research	Generate and adapt technologies for increased and sustainable agricultural production and to provide
		high quality, appropriate, cost-effective and efficient service to farmers
Irrigation		Put in place a well-regulated and profitable irrigation sector that is attractive to both the private sector
		and other development partners
Land Husbandry		Promote improved and sustainable productivity of farms and agricultural lands
Farm Power &		Contribute to increased agricultural production through the sustained use of appropriate farm
Mechanisation		machinery and equipment, appropriate tillage techniques, farm structures, crop storage, processing and
		packaging techniques suitable for small-scale farmers.
Livestock		Improve productive efficiency of livestock sector in a sustainable manner and support the marketing of
		both livestock and livestock products and contribute to food security and income.
Fisheries		Increase fish production and promote sustainable utilization of fisheries resources, thereby contributing
		to the economy through the generation of employment, income and improved availability of fish.
Agricultural		Create an enabling institutional and legal environment for the development of autonomous, transparent,
Cooperatives		viable and demand-driven cooperatives and other farmer organisations that will contribute to poverty
Development		reduction
Agricultural	Agricultural Marketing	Promote development of a competitive, efficient and transparent public and private sector driven
Marketing and		marketing system for agricultural commodities and inputs.
Credit	Agricultural Credit and Finance	Develop, in consultation with the ministry responsible for finance, and regulate an efficient, effective,
		demand driven and sustainable credit and rural finance system.
Agricultural and		Ensure that a critical mass of suitable and adequately trained manpower is produced so as to meet the
Cooperatives		needs of both the public and private sectors in a liberalized agricultural sector.
Training		

4.6. CITY BY-LAWS¹

City by-laws enshrined in the Local Government Act Chapter 480, Section 110, affirms council's mandate to regulate cultivation of crops within the boundaries of the municipality. It further states that "except with the written permission of the council, no cultivation of any open spaces shall be allowed for purposes of orderly development as any person who contravenes shall be liable to a fine". This connotes that current by-laws exclude the urban poor and peasant farmers who practice urban agriculture around the city. There is need however to incorporate the aspect of leasehold as by-laws for gardening and small scale farming if towns are to attain equilibrium between consumption and production capacities. In addition, the city by-laws are confined to land acquisition procedures and do not cover aspects constituting food production, processing, marketing, distribution, infrastructure development and waste management. The council however utilizes other legal instruments such as the Urban and Regional Planning Act that mandates planning for all land uses. The Public Health Act stipulates distribution and storage of quality food and clean environments as a basis for good health. However, factors of urbanization, population growth, taxation (market levies), hurdles in land acquisition procedures among others have resulted in the emergence of illegal occupancy of land for gardening, vandalism of water pipes to access water and street vending. These have brought a lot of controversy in the context of urban management and are in conflict with existing legislation, such as the National Agriculture Policy 2004-2015, hence the need to align policies towards cushioning urban poverty and improving food security.

The by-laws, dated 1962, are four pages long and have not been revised since then to match with social dynamics related to enhancing the food security of cities. Additionally, cities in the core and peripheral regions have no policies on urban agriculture despite the same being highlighted in the Urban and Regional Planning Act of 2015. Ndola is an exception to a certain extent as it has an Urban Agriculture Strategy and Policy developed under the support of RUAFF. The fact that policies and legislation are sectored based affects the institutional framework and how management systems are structured and monitored. There is therefore a need to harmonize policies on agriculture and other land uses including land tenure.

4.7. INSTITUTIONS AND SERVICE ORGANIZATIONS

Several institutions and service organizations have presence in Kitwe which include government departments and statutory bodies (Table 8).

¹ Section minimally edited from Chabalengula, S.K. 2015. Towards Sustainable Urban Food Policies in Local Authorities through Market Infrastructure and Logistics: A Kitwe Scenario, Zambia. Paper presented at the Urban Food Policy International Conference held from 16th to 18th November, 2015, Montpellier, France.

Table 8. Institutions and Service Organizations in Kitwe

Government	Statutory Organisations / state owned	Major Private Sector	Academia
Zambia Police Z and Prisons S Service, Social C Warfare Offices, ((A T L S S S P A I I I E ((S S S S S S S S S S S S S S S S S	Zambia Electricity Supply Corporation (ZESCO), Copperbelt Energy Corporation (CEC), Zambia Revenue Authority (ZRA), Zambia Telecommunications Company Limited (ZAMTEL), Zambia Postal Services (ZAMPOST), Railway Systems of Zambia (RSZ), National Pension's Scheme Authority (NAPSA), Zambia State Insurance Corporation (ZSIC), Energy Regulation Board (ERB), Zambia National Building Society (ZNBS), Zambia National Broadcasting Corporation (ZNBC), Anti-Corruption	Mopani Copper Mines (mining); agriculture input suppliers; international food retail chains (Shoprite, Game & Pick n Pay); fast food chains; clothing retail chains; motor companies (Toyota, Nissan, Ford)	Copperbelt University; Copperstone University Other private universities and colleges.

5.1. POPULATION IN THE CORE AND PERIPHERAL CITY REGION FOOD SYSTEM

In 2010, Zambia had a population of 13,046,508 made up of 6,394,455 males and 6,652,053 females (CSO, 2011). An estimated 7,978,274 people (61%) resided in rural areas whereas 5,068,234 (39%) resided in urban areas. The Copperbelt Province, with the second largest population after Lusaka, had 1,958,623 people out of which 973,770 are males and 984,853 are females. The average annual population growth rate in the 1990-2010 inter-censal period for the Copperbelt Province was 2.0% for males and 2.3% for females.

Kitwe has 27% (522,092) of the Copperbelt Province population and 4% of Zambia's population. Half of Kitwe's population are females. The population density 671.9 people per Km² which is the second highest population density in Zambia after Lusaka (4,841.6). About 275,837 people in Kitwe are above 18 years of age. Kitwe's average annual population growth rate is above the national average of 2.8% at 3.2% for males and 3.5% for females giving and average of 3.3%. There are a total of 99,122 households (Table 9). In terms of political divisions, the district has five constituencies with a total of 28 wards.

Table 9. Population size, growth and distribution for 2010

Category		Distribution Male Female Total				nual grow	rth (2000	0-2010)	Density	Pop. Share (%) ^a	Population ≥18 years
	Male	Female	Total		Male	Female	Total	Zambia	17.3		6,069,753
Copperbelt	973,770 (49.7%)	984,853 (50.3%)	1,958,623	384,035	2.0	2.3	2.2	2.8	62.5	15.0	998,040
Kitwe	260,216 (50%)	261,876 (50%)	522,093	99,122	3.2	3.5	3.3	2.8	671.9	26.7	275,837
Constituencies											
Chimwemwe	57,045	59,093	116,138	22,351						22.2	58,778
Kamfinsa	43,219	43,543	86,761	16,867						16.6	45,717
Kwacha	71,257	68,738	139,996	26,365						26.8	76,627
Nkana	41,554	42,382	83,936	16,072						16.0	46,452
Wusakile	47,141	48,120	95,261	17,467						18.2	48,263
Wards											
<i>Chimwemwe (1)</i> Itimpi	5,873	5,630	11,503	2,393						2.2	5,788
Twatasha	11,649	12,189	23,838	4,740						4.6	11,554
Kawama	18,641	18,972	37,613	7,509						7.2	17,590
Buntungwa	8,301	8,871	17,172	3,122						3.3	9,377
Lubuto	5,745	6,193	11,938	2,077						2.3	6,743
Chimwemwe	6,836	7,238	14,074	2,510						2.7	7,726
<i>Kamfinsa (2)</i> Bupe	8,221	8,776	16,997	3,014						3.3	9,551
Ndeke	23,801	25,228	49,029	9,719						9.3	25,220
Kafue	3,493	3,468	6,961	1,541						1.3	3,421
Kamfinsa	7,704	6,070	13,774	2,593						2.6	7,525
<i>Kwacha (3)</i> Kwacha	9,008	9,214	18,222	3,322						3.5	9,539

Bulangililo	13,364	14,266	27,630	5,137			5.3	14,420
Ipusukilo	21,645	21,392	43,037	8,826			8.2	21,034
Chantete	1,521	1,466	2,987	716			0.6	1,445
Riverside	19,317	16,247	35,564	5,765			6.8	23,008
Lubwa	6,402	6,154	12,556	2,599			2.4	7,181
Nkana (4)	5 760	5 9 7 5	11 5 9 5	2 646			2.2	6 6 8 1
Rokana	5,700	5,825	11,565	2,040			2.2	0,081
Parklands	3,596	3,798	7,394	1,548			1.4	5,218
Buchi	11,356	11,619	22,975	4,234			4.4	12,193
Mukuba	2,793	2,949	5,742	1,208			1.0	3,503
Miseshi	8,490	8,651	17,141	3,001			3.3	9,197
Mindolo	7,609	7,648	15,257	2,574			2.9	7,844
Kamakonde	1,950	1,892	3,842	861			0.7	1,816
Wusakile (5)	1.063	1 099	2 9/2	152			0.7	1 002
Limaposa	1,003	1,088	3,042	455			0.7	1,002
Luangwa	14,774	15,291	30,065	5,886			5.8	14,490
Chamboli	10,971	10,874	21,845	3,649			4.2	11,510
Chibote	8,201	8,323	16,524	2,783			3.2	8,909
Wusakile	12,132	12,544	24,676	4,696			4.7	12,352

NB. °/: Population share in % = statistics for Copperbelt reflect the share of national population while that for Kitwe relates to the Copperbelt Province's population.

5.2. ECONOMY AND POVERTY IN THE CORE AND PERIPHERAL REGION

5.2.1. Economy of the core and peripheral region

Kitwe is called the commercial hub of the Copperbelt Province and shares district boundaries with Ndola, Chingola, Mufulira, Luanshya and Kalulushi. All these towns are mineral rich particularly in copper and cobalt and the economy of Kitwe is dominated by mining and mining related activities (UN Habitat, 2009). Additionally, the city has manufacturing facilities that produce and export batteries, clothing, other consumer and industrial goods. Heavy industrial goods are produced in the heavy industrial area and domestic goods are produced in light industrial area. Manufacturing for household goods include food, textiles, leather and a range of other household products.

Retail, small and large scale, has seen a rise since the opening up of the Copperhill Mall in the district followed by the nation's largest Mukuba Shopping Mall. These two retail centers have seen the coming into Kitwe of international retail chains specialized in household and industrial goods including unprocessed agricultural products from within the city region and the city region food system.

5.2.2. Poverty in the core and peripheral region

Even though actual statistics on poverty in each of the districts of the core and peripheral region are not available as yet, it has been reported that poverty changes by provinces in the period 2006 and 2010 was 37.3% and 34.3% (CSO, 2012). Changes in extreme poverty in the two years also showed a decline from 19.5% to 18.3%.

5.2.3. Employment in the core and peripheral region

Copper and cobalt mining is the largest employer in Kitwe. Other economic activities include agriculture, trade, commerce, industry (mainly mining related), forestry, and fisheries. The trades and services sector is second in number of workers/employees (Mwitwa and Ng'andwe, 2010).

Unemployment rates grew with the decline of the mining sector in the 1990s. Like other mining towns in Zambia, Kitwe's Nkana Mine retrenched hundreds of miners most of whom are now self-employed in the informal secto². Incomes to support livelihoods include small-scale entrepreneurs and quarrying for industrial minerals like laterite, gravel, and sand for building. Quarrying is small-scale and informal, carried out by residents in locations rich in these resources. Small-scale trading, since the liberalization of the economy, has become a significant provider of employment in the district. The rise of informal small-scale trading has created informal employment opportunities for people who were either retrenched or could not find employment due to the closure or restructuring of some companies particularly the mines. Additionally, informal trading is also common among women and the youth with agricultural products, both processed and unprocessed being traded. Vegetables are commonly sold by female vendors in residential areas as well as along some main streets of the city.

² For Zambia as a whole it is estimated that the informal sector contributes 48.9 percent of Zambia's gross national product (World Bank, 2004, 2006, Zambia Country profile)

With the decline in metal prices, averaging about US\$4,592 per tonne (LME, 2015) in early December 2015, on the London Metal Exchange from the January 2014 price of US\$7,293.77 (Metals about, 2015), it is expected that informal trading will increase with the likely loss of mining jobs. The drop in copper prices coupled with decline in electricity supplies to the mines has resulted in one mining company, Mopani Copper Mines, to retrench more than 4,000 employees in Kitwe alone. This is likely to place more people in the informal sector as well as in farming in peri-urban areas of Kitwe.

Apart from mining, the population of Kitwe (core region food system) and the Copperbelt Province (peripheral region food system), are engaged in sectors ranging from agriculture, fisheries, forestry and hunting to community, social and personal services. Employment in value addition is captured under manufacturing, wholesale and retail, trade, restaurants and hotels (CSO, 2013).

Within the core and peripheral region food system, an estimated 369,900 (35%) and 512,184 (40%) of the urban and rural 12 years and older population respectively, were estimated to be usually working in various sectors of the economy (CSO, 2013). The largest proportion of usually working people is constituted by the 25-34 year age group (Figure 4).



Figure 4. Rural and urban male and female usually working population in the core and peripheral region food system based on age groups (data from CSO, 2013).

In both rural and urban areas, males constitute the largest proportion of people who are usually working. The trend obtaining when the core and peripheral region food system are combined is similar to what is obtaining in the core region (Figure 5).



Figure 5. Rural and urban male and female based on age groups and rural and urban usually working population in the core and peripheral region food system (data from CSO, 2013).

Kitwe has the largest urban working population followed by Ndola compared to their rural populations. However, the largest rural working populations are found in Lufwanyama, Masaiti and Mpongwe. These three areas are known to food regions for Kitwe and other urban centres on the Copperbelt Province including Kabwe and Lusaka.

5.2.4. Employment in agriculture, fisheries, forestry, hunting and manufacturing

An estimated 166,416 people are employed in agriculture, fisheries, forestry and hunting within the core and peripheral region food system (Table 10).

Region	Total U	Isually Worki	ng Pop.	Agricultur	e, Fisheries, Hunting	Forestry &	N	A anufacturir	ng	Population 12 years: Skilled Agricultural, Forestry & Fisheries Workers			
	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total	
Chililabombwe	3,855	17,460	21,315	2,869	1,027	3,896	36	426	462	2,797	995	3,792	
Chingola	10,841	41,584	52,425	8,814	2,943	11,757	284	2,285	2,563	7,345	2,486	9,831	
Kalulushi	8,955	18,124	27,079	7,335	2,465	9,800	129	924	1,053	5,618	2,239	7,857	
Kitwe	5,720	117,724	123,444	4,592	6,374	10,966	133	10,000	10,133	3,576	6,162	9,738	
Luanshya	7,385	25,441	32,826	5,815	2,848	8,663	130	2,294	2,424	4,292	2,493	6,785	
Lufwanyama	27,387	788	28,175	24,133	644	24,777	155	6	161	20,243	204	20,447	
Masaiti	32,870	695	33,565	32,870	388	33,258	190	7	197	30,591	359	30,950	
Mpongwe	37,414	7,055	44,469	34,100	5,170	39,270	173	108	281	32,999	4,407	37,406	
Mufulira	3,741	33,037	36,778	3,041	6,017	9,058	56	1,805	1,861	2,121	4,555	6,676	
Ndola	-	107,992	107,992	-	14,971	-	-	10,860	10,860	-	12,386	12,386	
Copperbelt	142,284	369,900	508,068	123,569	42,847	166,416	1,286	28,715	30,001	109,582	36,286	145,868	

Table 10. Core and peripheral region food system employment and skills statistics in agriculture, fisheries, forestry, hunting and manufacturing

This constitutes 32.5% of the total usually working population. In terms of age groups, the sector employs about 13% of the population which is 12 to 19 years of age (Figure 6). This shows that under age children may be contributing to the food distributed and consumed within the food system. The 20 to 44 years age group constitutes more than 55% of the population involved in agriculture, fisheries, forestry and hunting.



Figure 6. Rural and urban male and female population involved in agriculture, fisheries, forestry and hunting in the core and peripheral food region based on age groups

Within the core region food system however, only 5.3% (6,537) males and 3.6% (4,429) females of the total usually working population are involved in agriculture, fisheries, forestry and hunting (Table 11). Out of this male group, 59.6% (3,882) are urban and 40.6% (2,655) are in the rural areas. In the female group, 56.3% (2,492) are in the urban and 43.7% (1,937) are in the rural areas. As the bulk of the food in the core and peripheral regions is produced in rural areas, this distribution of producers favoring urban areas may likely be an indicator of the fact that little that is distributed and consumed in the core region is actually produced from this region.

100	Tot	al Pop	Total I	Isually Morkin	g Don	Agr	riculture,	Fisherie	s, Forest	ry & Hunt	ting			Manufa	icturing		
Group	101	ai rop.	TULAT		g rop.		Male			Female			Male			Female	
Group	Rural	Urban	Rural ^a	Urbanª	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
12-14	1,137	38,126	80	210 (101,	290	33	8	41	30	5	35	-	1	1	-	-	-
			(41, 39)	109)													
15-19	1,633	62,280	325	2,176	2501	129	95	224	151	62	213	1	107	108	3	21	24
			(154,	(1261, 915)													
			171)														
20-24	1,159	49,579	629	11,422	12,051	279	280	559	217	145	362	17	587	604	3	193	196
			(364,	(7124,													
			265)	4298)													
25-29	1,106	46,751	786	22,154	22,940	332	385	717	269	185	454	20	1,403	1,423	2	370	372
			(445,	(14328,													
			341)	7826)													
30-34	960	37,508	772	22,949	23,721	353	481	834	218	231	449	19	1,538	1,557	2	370	372
			(488,	(15478,													
			284)	7471)													
35-39	769	28,739	631	18,937	19,568	282	466	748	186	257	443	18	1,349	1,367	3	349	352
			(399,	(12731,													
			232)	6206)													
40-44	642	19,579	521	13,291	13,812	240	402	642	142	264	406	14	967	981	3	245	248
			(334,	(8977,													
			187)	4314)													
45-49	482	14,826	418	9,662	10,080	190	302	492	142	298	440	7	722	729	1	195	196
			(243,	(6312,													
			175)	3350)													
50-54	450	11,512	394	7,198	7,592	163	319	482	177	389	566	3	528	531	1	126	127
			(197,	(4660,													
			197)	2538)													

Table 11. Core region food system employment statistics for 12 years and older population by industry, age and sex

55-59	366	7,866	306	4,400	4,706	146	362	508	118	285	403	2	362	364	1	71	72
			(177,	(2989,													
			129)	1411)													
60-64	347	5,751	294	2,613	2,907	161	310	471	110	183	293	3	216	219	-	30	30
			(171,	(1833, 780)													
			123)														
65-69	244	3,572	210	1,430	1,640	126	217	343	74	116	190	-	111	111	1	21	22
			(131, 79)	(998, 432)													
70-74	207	2,357	164	719	883	91	142	233	54	41	95	5	58	63	-	7	7
			(105, 59)	(548, 171)													
75+	277	2,919	190	563	753	130	113	243	49	31	80	4	52	56	-	1	1
			(137, 53)	(433, 130)													
TOTAL	9,779	331,365	5,720	117,724	123,444	2,655	3,882	6,537	1,937	2,492	4,429	113	8,001	8,114	20	1,999	2,019

^a/: Number in parenthesis reflects number of males and females.

The largest producer age group is the 30 to 34 year group even though the proportion of female producers is lower than that of male producers with the exception of the 50-54 age group (Figure 7). There is a noticeable decline in the population of male producers from the 35-39 year age group. The difference between the number of male and female producers narrows starting from the 35-39 year old age group till the 55-59 year age group.



Figure 7. Distribution of rural and urban male and female involvement involved in agriculture, fisheries, forestry and hunting in the core region food system.

In terms of skilled agricultural, fisheries and forestry persons (Table 11), out of 508,068 people constituting the usually working population, only 9,738 (1.9%) people in the core region and 145,868 (28.7%) people in both the core and peripheral regions are skilled agricultural, fisheries and forestry workers. The 28.7% skilled persons in the food system are concentrated in rural areas (75.1%) and the rest in the urban areas. Kitwe and Ndola are two exceptions with over 60% of skilled persons residing in urban areas. However, Lufwanyama, Masaiti and Mpongwe apart from having the largest number of skilled workers in this category, have about 94.4% of skilled persons residing in rural areas (Table 10; Figure 7). This probably reflects the reason why these three areas have agricultural based economies and supply a large portion of foods processed, distributed and consumed in Kalulushi, Kitwe, Luanshya and Ndola.



Figure 8. Distribution of skilled agricultural, fisheries and forestry workers in the core and peripheral region food system for Kitwe

5.2.5. Employment in wholesale, retail, trade, restaurants, hotels and transport and storage employment

An estimated 16.9% of the usually working population of the core and peripheral region food system is employed in wholesale, retail, trade, restaurants and hotels while only 4.3% are employed in transport and storage (Table 12). Ndola and Kitwe have the largest share of people employed in the two subsectors based on the fact that they have more wholesale, retail, trade, restaurants and hotels. Between the two towns, they have more than 60% of people employed in the two sub-sectors are in Kitwe and Ndola. Interestingly the correlation coefficient between the two subsectors is 0.98 indicating that the higher the number of wholesale, retail, trade, restaurants and hotel employment the higher the number of people employed in transportation and storage. The wholesale, retail and trade sector in Kitwe and Ndola includes unprocessed and processed agricultural produce and livestock. These businesses range from multinational chains stores such as Shoprite, Pick n Pay, Game Stores and Spar to medium scale local businesses and roadside markets.

A comparison between the number of people employed in agriculture, fisheries, forestry and hunting against:

- Wholesale, retail, trade, restaurants and hotels; and
- Transport and storage.

Region	Tota	l Usually Workir	ng Pop.	Wholesale,	Retail, Trade, R Hotel	estaurants &	Transport & Storage				
	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total		
Chililabombwe	3,855	17,460	21,315	384	2,709	3,093	53	515	568		
Chingola	10,841	41,584	52,425	246	7,600	7,846	61	2,242	2,303		
Kalulushi	8,955	18,124	27,079	368	3,711	4,079	52	602	654		
Kitwe	5,720	117,724	123,444	184	32,153	32,337	29	7,445	7,474		
Luanshya	7,385	25,441	32,826	445	5,415	5,860	41	1,289	1,330		
Lufwanyama	27,387	788	28,175	302	6	308	73	4	77		
Masaiti	32,870	695	33,565	593	40	633	91	10	101		
Mpongwe	37,414	7,055	44,469	838	721	1,559	95	112	207		
Mufulira	3,741	33,037	36,778	83	5,408	5,491	12	1,288	1,300		
Ndola	-	107,992	107,992	-	24,946	24,946	-	8,080	8,080		
Copperbelt	142,284	369,900	508,068	3,443	82,709	86,152	507	21,587	22,094		

Table 12a.Employment in wholesale, retail, trade, restaurants, hotels, transport and storage in the Kitwe city region food system

	Tot	Total Pop.	Total Usually Working Pop.			Wholesale, Retail, Trade, Restaurants & Hotel						Transport & Storage					
Age Group	TOU	ar Pop.	TOLAT	Sually wor	king Pop.		Male			Female			Male			Female	
	Rural	Urban	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
12-14	1,137	38,126	80	210	290	1	12	13	1	6	7	-	1	1	1	-	1
15-19	1,633	62,280	325	2,176	2,501	3	326	329	7	314	321	1	108	109	-	8	8
20-24	1,159	49,579	629	11,422	12,051	13	1,891	1,904	11	1,763	1,774	4	777	781	-	22	22
25-29	1,106	46,751	786	22,154	22,940	13	3,332	3,345	21	2,957	2,978	3	1,574	1,577	-	46	46
30-34	960	37,508	772	22,949	23,721	14	3,233	3,247	20	3,139	3,159	9	1,675	1,684	1	37	38
35-39	769	28,739	631	18,937	19,568	8	2,513	2,521	16	2,736	2,752	6	1,286	1,292	-	22	22
40-44	642	19,579	521	13,291	13,812	6	1,576	1,582	10	1,968	1,978	3	725	728	-	23	23
45-49	482	14,826	418	9,662	10,080	3	919	922	12	1,519	1,531	1	457	458	-	8	8
50-54	450	11,512	394	7,198	7,592	1	611	612	4	1,046	1,050	1	281	282	-	13	13
55-59	366	7,866	306	4,400	4,706	1	420	421	5	625	630	-	172	72	-	5	5
60-64	347	5,751	294	2,613	2,907	2	269	271	4	389	393	-	111	111	-	2	2
65-69	244	3,572	210	1,430	1,640	-	142	142	2	207	209	-	48	48	-	-	-
70-74	207	2,357	164	719	883	2	66	68	1	75	76	-	24	24	-	2	2
75+	277	2,919	190	563	753	1	44	45	2	55	57	-	18	18	-	-	-
TOTAL	9,779	331,365	5,720	117,724	123,444	68	15,354	15,422	116	16,799	16,915	28	7,257	7285	2	188	190

Table 12B. Employment in wholesale, retail, trade, restaurants, hotels, transport and storage in the core region food system

Revealed that:

- There is a -0.48 correlation coefficient between agriculture, fisheries, forestry and hunting numbers of employees and the number of workers employed in wholesale, retail, trade, restaurants and hotels;
- The number of employees in agriculture, fisheries, forestry and hunting negatively (-0.52) correlates with the number of employees in the wholesale, retail, trade, restaurants and hotels.

This indicates that districts with the largest number of people employed in agriculture, fisheries, forestry and hunting are likely to have less businesses dealing in wholesale, retail, trade, restaurants and hotels as well as transport and storage. This is true of the situation as Lufwanyama, Masaiti and Mpongwe are primarily rural and have little infrastructure. There is also a likelihood that these are primarily producer districts that feed into the businesses found in Kitwe and Ndola, districts that do not produce as much as the three districts.

Other employment statistics are in Appendix I:

- Accommodation and food services;
- Information and communication;
- Finance and insurance;
- Community, social and personal services;
- Water supply in urban areas;
- Real estate.

6.1. NATURAL RESOURCES, LAND USE AND COVER, CLIMATE CHANGE MITIGATION AND ADAPTATION

6.1.1. Natural resources in the core and peripheral region

According to Storrs (1995), the greater part of Zambia is covered by plateau miombo which is twostoreyed woodland with an open and semi-evergreen canopy which is 15 – 20m high. The principle trees are always *Brachystegia*, *Julbernardia* and *Isoberlinia* species. Soils in miombo woodlands are generally poor, shallow and slightly acidic, having quartz rubble or laterite underneath (ibid).

The vegetation types of the Copperbelt Province, which includes Kitwe, is characterized by a single storey of deciduous, closed canopy of Miombo woodland with common tree species being *Albizia* antunesiana, Albizia versicolor, Anisophyllea species, Baphia bequaertti, Brachystegia boehmii, Brachystegia utilis, Isoberlinia angolensis, Julbernardia paniculata, Marquesia macroura, Pericopsis angolensis, Parinari curatellifolia, Uapaca kirkiana, and Uapaca nitida. Mwekera National forest is characterized by large termite moulds of up to 6 meters and sometimes even more. Annual rainfall received in Kitwe ranges between 800 and 1500 mm per year, and the average monthly minimum and maximum temperatures of 20°C and 36°C respectively.

6.1.2. Land use and cover in the core and peripheral region

The total land area for the Copperbelt Province is estimated at 31,328 Km² or 3,132,829 ha (DACO, 2012). Out of this 3,070 Km (9.8%) is under cultivation in 2012 up from 8.6% in 2001 and 6.26% in 1990 (Figure 9 and Table 13).



Figure 9. Land use and cover for the Copperbelt Province from 1990 (top left) and 2001 (top right). (Source: WWF, Miombo ecoregion project)

The area under agriculture, settlements moist soil-crop fields shows an increase of about 3.6% from 1990 to 2001. It can be assumed that this change in land use and cover should also have been reflected in either the total food production or the diversity of crops and livestock produced in the core and

peripheral region. The decline in the size of the water body from 0.42% to 0.37% has both an advantage and a disadvantage. The advantage is that there is likely to be an increase in the size of land under cultivation in moist soils as long as the area which not under water is suitable for agriculture. The disadvantage is that there is likely to be a threat of lack of adequate water for domestic and agriculture use with an increase in the decline of water bodies in the region.

Land use and cover	1990		2001	
	%	Km ²	%	Km ²
Cultivated / settlements & bare land	6.26	1,961	8.6	2,694
Water body	0.42	132	0.37	116
Wetlands / dambo / moist soil-crop fields	0.80	251	2.06	645
Secondary regeneration Miombo woodland	32.19	10,085	38.78	12,149
Sparse old Miombo woodland	32.32	10,125	21.28	6,667
Thick old Miombo woodland	28.0	8,772	28.91	9,057

Table 13. Use and cover changes for the Copperbelt Province from 1990 to 2001

Source: Based on maps by WWF (Miombo Ecoregion Project)

The total land area for Kitwe is estimated to be 777 Km² (Chabalengula, 2015). The land use and cover in Kitwe is predominated by vegetation/pasture/agriculture that make up 66.4%, followed by built up areas and bare land at 21%, forests at 12.4% and water bodies at 0.2% as estimated in 2015 (Figure 10).



Figure 10. Land use and cover map of Kitwe (built up/bare land=21%; forests = 12.4%; vegetation/pasture/agriculture = 66% and water = 0.2%)

The main river is the Kafue River, Zambia most economically important river, which passes through Chililabombwe, Chingola, Mufulira, Kitwe, Luanshya, Lufwanyama and Mpongwe districts. There are several perennial streams and rivers in all the districts which form part of the network of tributaries of the Kafue River (Figure 11). The main tributaries are Mwambashi River, Miengwe River, Kafulafuta River, Luswishi River, Mwekera River, Kafubu River and Chowa River.



Figure 11. Hydrological map of the Copperbelt Province. (Source: WWF, Miombo ecoregion project)

6.1.3. Climate change, mitigation and adaptation

6.1.3.1. Climate change and variability impacts in the food system

The Kitwe city region food system, particularly the core and peripheral region, is vulnerable to current and future climate change and variability, and has already recorded increases in temperature and reduced rainfall in the last few decades, with temperatures estimated to increase at 0.6°C every ten years (IPCC, 2007). Frequency of occurrence of drought, seasonal floods and flush floods, extreme temperatures and dry spells along with their intensity and magnitude has also increased. For example, the onset of the 2015/2016 rainy season has been delayed in many parts of the food region particularly in the central, southern and western parts of Zambia. The food region has not been spared the impacts of climate change and variability. This is worsened by the food region being in a developing country where increased vulnerability and limited resources to fully deal with the problems of climate change and variability impacts are generally poorly managed.

Since climate change disproportionately affects the poor who have increased incidences of hunger, health epidemics and loss of shelter and livestock, the country will have to refocus its development programs in order to make growth pro-poor. Increasing public investment in adaptation and mitigation and projects enhance the Zambia's rich environmental and natural resource assets will help to put the economy on sustainable development path in this era of CC (IFPRI, 2009). Table 14 provides impacts of climate change and variability across the food region (core, peripheral and part of the other region within Zambia) from the 1972/73 to the 2007/08 rainy seasons.

Some of the impacts (Riche, 2007) that have been recorded in the food region are:

Droughts:

- a. Crop Damage leading to food shortage and hunger;
- b. Water shortages;
- c. Reduced fish stock;
- d. Income loss;
- e. Reduced charcoal business;
- f. Increase in diseases affecting humans and animals;
- g. Decreased water quality;
- h. Increased soil erosion;
- i. Decreased soil fertility;

Floods:

- a. Crop damage/loss, leading to food scarcity and hunger;
- b. Loss of crop land and grazing ground;
- c. Decline in fish catches;
- d. Increase in diseases (malaria, dysentery, Cholera);
- e. Destruction of infrastructures (houses, roads);
- f. Life loss (humans and Livestock);
- g. Reduced fish stocks;
- h. Decreased livestock feed;
- i. Reduced water quality.

Extreme Heat:

- a. Increase in diseases affecting animals, crops and humans;
- b. Decreased human capacity to do work;
- c. Loss of life (animals and humans);
- d. Crop damage/loss;
- e. Reduced fish stocks;
- f. Decreased livestock feed;
- g. Reduced water quality.

Shorter Rainy seasons:

- a. Decreased crop yields;
- b. Crop damage/loss;
- c. Decreased income from crop selling;
- d. Crops do not reach maturity.

Table 14. Climate change and variability and its impacts

Season	Selected social economic and environmental impacts in the food region
1972/73	Poorest rainy season in 50 years; drought caused substantial drop in crop yields and a reduction in groundwater reservoirs
1972/73	Southern, Central and Lusaka Provinces experienced dry weather conditions. Marketed
	maize was only 46 % of annual requirement.
1978/79	A drought rainy season, reducing maize production by 25 – 40 percent
1979/80	A poor rainfall distributed rainy season with elongated dry spells. This caused considerable
	losses to the 1980 maize crop in Southern Province.
1981/82	Below normal rainfall caused reductions in crop production as well as livestock production.
	Rainfall deficits ranged from 30 to 50 % in Southern & Western and 10 to 40 % elsewhere.
	The Luano Valley of Central Province experienced significant famine
1982/83	Frequent dry spells during the season led to poor performance in the agricultural sector,
	especially over the southern half of Zambia
1983/84	Drought reduced agricultural yields for the third consecutive season; worst affected areas
	were Southern, Central and Western Provinces
1986/87	Frequent dry spells between February and March led to widespread crop failure in
	Southern Province.
1988/89	Heavy rains in mid-season caused extensive water logging in crop fields; around Lusaka
	many people whose houses collapsed were left homeless and lost other household
	property.
1989/90	Persistent dry spell caused severe moisture stress in the major maize growing areas of
	Southern, Central and Eastern Provinces.
1990/91	Southern, Central and Lusaka Provinces experienced dry weather conditions. Marketed
	maize was only 46 % of annual requirement.
1991/92	Worst drought for many years hit the most critical crop stage (silk formation). All areas
	were declared disaster areas.
1999/2000	Heavy rainfall caused floods in many parts of the country. (Season of "Mozambique"
	Floods).
2005/06	Heavy rainfall resulted in flush floods especially in the lower Zambezi (Kazungula floods,
	Kafue Gorge mudslide resulting in countrywide power outage).
2007/08	Excessive rains over much of the country resulting in flash floods.

Source: Kasali (2008) as quoted in Sikombe (2013).

Zambia experienced worse drought in 1992/93 while the wettest conditions were recorded in 1978/79. Within the past seven years from 2001 to 2008 the food region has experienced droughts and floods with the frequency of occurrence of drought and floods and their intensity and magnitude being on the higher side. The recent extreme event in relation to floods occurred in the 2007/08 rainy season, affecting a wide geographical area in the food region (ZVAC, 2008).

During the floods of 2007, 65% of the households in North-western Province were affected by the floods and 33% of those on the Zambezi plains were displaced and another 17% had to relocate to alternative homesteads on the uplands (Bwalya, 2007). Household goods and livestock were damaged and lost during the floods and those adversely affected faced critical hunger and had to depend on

humanitarian assistance and wild-food (Bwalya, 2007). Some of the effects recorded included an increase in the incidence of hunger due to destruction of crops, reduction in cultivatable land and increased soil erosion; loss of shelter, displacement of people and disruption of communication due to destruction of basic infrastructure such as roads and bridges, an increase in the incidence of epidemics such as malaria and waterborne diseases and reduced nutrition and natural resource based livelihoods including livestock (AIACC, 2004).

This means that livelihoods based on agricultural systems on the flood plains and other seasonally inundated lands may no longer be sustainable and households need to identify other livelihood systems outside these systems. Livelihood disruptions and poverty levels are expected to increase due to adverse effects of climate change, and concrete adaptation interventions are needed to promote sustainable livelihoods and reduce rural poverty.

6.1.4. Sustainability and resilience of the Kitwe CRFS

6.1.4.1. Disaster management and risk reduction systems in the food region

The food region is governed by the National Adaptation Plan for Action (NAPA) which identifies priority activities that respond to Zambia's urgent and immediate needs to adapt to climate change and variability. The NAPA prioritizes agriculture, health, water and energy and natural resources as the sectors where adaptation programmes need to be immediately carried out. The country has also developed the National Climate Change Response Strategy (NCCRS). The NCCRS has been developed to support and facilitate a coordinated response to climate change issues in the country. The Strategy will enable Zambia position itself strategically to respond to the adverse impacts of climate change (Bwalya, 2007).

Additionally, there is also the disaster management policy which stipulates the roles of government institutions, civil society or non-governmental organizations, the donors, disaster management team and the church in disaster management and mitigation operations. The Zambia National Disaster Management Policy main objective is to strengthen national capacities for effective disaster preparedness response, mitigation, restoration and prevention in order to protect lives and livelihoods, property, the environment and the economy (National Disaster Management Policy, 2005). To achieve this, the policy stipulates that:

- i. The disaster management unit will conduct capacity building for disaster preparedness and timely response;
- ii. Conduct and improve vulnerability and risk assessment for communities;
- iii. Provide information on sustainable agriculture practices including re- aforestation ;
- iv. Facilitate economic independence through livelihood diversification and resistant crop variety promotions.

During disasters, the Disaster Management Consultative Forum becomes a key forum for information exchange among stakeholders with the coordination of DMMU. The Emergency Operations Center becomes the centre for the exchange of information and decision making for the disaster at hand. After the event, ZVAC undertakes an in-depth assessment to ascertain the full extent of the damage done by the disaster.

DMMU working with the other stakeholders conducts a lessons learnt session to see where improvements need to be made. Unfortunately, currently the Emergency Operations Center is not yet fully equipped. Risk and vulnerability profiles have not been compiled for all districts and this has slowed the incorporation of risk reduction approaches into programmes of affected communities. The plans to scale up the Comprehensive Vulnerability Assessment Analysis (CVAA) have been drawn and it is hoped that vulnerability and risk profiles will be elaborated for all districts. This will form a baseline on which future DRR interventions will be tailored and will form a basis for the measurement of the impact of such interventions. The contingency plan is costed and resources to implement the identified activities are then sourced. For recovery, after the in-depth assessment an action plan to aid recovery is further developed.

However, this has not been happening such as in Mpongwe where flooding displaced local communities, as no risk assessments are conducted and the communities have not been provided with any capacity building in sustainable agriculture and diversification in resistant crop variety to help deal with the impacts of climate change and variability. There are also no re-forestation strategies to replace the trees that are cut down for charcoal. In terms of the involvement of stakeholders by the disaster management unit, the policy states that information and public and awareness systems will be provided at all levels as well as building of effective networks and interfacing with stakeholders at all levels of disaster risk reduction strategies.

Though the policy clearly outlines how the DMMU should operate in relation to disasters, the government or the DMMU itself does not adhere to the guiding principles of the policy of how their operations in relation to disasters should be undertaken as stipulated in the policy. Furthermore, there is generally lack of disaster prevention, preparedness and mitigation, which should be integral parts of disaster management and development in Zambia. In addition, there is no provision of capacity strengthening to prevent, reduce or mitigate the effects of disasters though stipulated as top priority of the government in the national policy. The lack of an early warning system and disaster preparedness system and capacity makes it especially difficult for people to cope with the disasters as they are always caught unaware with no time to deal with the calamities that follow.

The DMMU does not conduct any educational training or provide alternative livelihood practices that can promote sustainable development among the vulnerable communities even though this is also part of their mandate. Trainings are helpful in improving resilience to disasters as well as important in good and effective environmental management activities that help reduce the impacts of climate change and variability activities that exacerbate impacts. The policy outlines the roles of the institutional frameworks and though every district has the District Disaster Management committee which is chaired by the District Commissioner, which is part of the DMMU structure, there are no satellite committees at the community level which are cardinal in planning for and identifying the major problems that are faced by the local people. However, even though the district disaster sub-committees are in place they are non-functional as they do not have the technical knowhow and do not receive any funding for their activities, and thus are incapable of handling problems that arise as a result of climate change and variability impacts.

6.1.4.2. Adaptation and disaster mitigation in the food system

The food region's adaptive capacity has largely been constrained by inadequate financial and technical resources that have compounded long-standing structural constraints to growth and development (IFPRI, 2009). Though climate change issues have been domesticated in some of the region's development plans, more resources need to be allocated, and program development and implementation need to be done in a more robust way. Additionally, institutions mandated to contribute to disaster mitigation efforts lack comprehensive proactive strategies to address climate change induced disasters, rendering their response to disasters mostly inadequate and transitory (IUCN, 2007). The food region's producer communities, who are primarily rural peri-urban and rural, do not have the means to adapt to climate change and variability disasters. These have the potential to weaken their already stressed capacities by weakening community assets, through community disruptions, on which they draw their means for survival.

Factors determining resilience

- i. Governance and management systems for adaptation and disaster risk reduction
- ii. level of diversification in relation to crops that can withstand climatic and economic changes
- iii. Yield of such crops per given period of time
- iv. Number of farmers receiving training on crop diversification.

✤ Agriculture, food security and water sector

Well known measures in adaptation include altering crop strains to enhance their drought and pest resistance, changing planting times and cropping patterns, and altering land topography to improve water uptake and reduce wind erosion. Diversification is an option, for example, by combining food crops, livestock and agro-forestry, and the introduction of cheap insurance schemes can help people cope with crop losses. Furthermore, adaptation measures include actions on both water supply and water risks, such as protecting water supply infrastructure and traditional water supply sources, developing flood ponds, water harvesting, improved irrigation, desalination, non-water-based sanitation and improved watershed and trans-boundary water resource management as well as Integrated water resource management (IWRM) provides the accepted framework for such actions (Bodansky, 2010). In line with this, the Water Resources Management Authority has been established to spearhead integrated water resources management in the food region's basin and catchments. Additionally, the Ministry of Agriculture and Cooperatives has promoted the growing of drought resistant crops particularly in the worst drought affected areas of the food region such as cassava, sorghum and millet. The uptake of these crops has been poor primarily due to traditional crop preferences.

Health sector

Measures include early warning systems and air-conditioning to address extreme weather events; systematic action on water- and vector-borne diseases to raise public awareness of watershed protection, vector control, and safe water and food-handling regulations; the enforcement of relevant regulations; and support for education, research and development on climate-related health risks. As an example, early warning messages and public awareness campaigns are annually conducted prior to

the onset of the rainy season in order to prevent the outbreak of water borne diseases such as cholera that have the potential to negative impact on agricultural production within the food region.

Environmental management, Awareness raising and education

Healthy ecosystems provide significant benefits for resilience, livelihoods, risk reduction and adaptive capacity. Measures include protecting ecosystems, and enforcing regulations negative environmental practices that degrade the quality of the environment and may thus have future impacts on livelihoods and the crop productive capacity of the ecosystem. Measures include instituting specific measures to disseminate advice on appropriate actions that lead to the protection of the environment. Measures include supply of information to community groups and women's networks, radio and television programmes, public poster campaigns, and leadership by national figures and celebrities.

6.2. THE AGRICULTURE AND FOOD VALUE CHAIN IN THE KITWE CRFS

The agriculture and food value chain for the Kitwe city region food system (Figure 12) is an important tool to understand the vertical and horizontal factors that can impact long-term profitability of agribusiness and necessary in developing a strategic plan for the agribusiness (Gloy, 2005). The goal of the value chain is basically, apart from understanding it, to provide sustainable access to affordable inputs, food, fibre (KPMG, 2013) and many more products when viewed from a functional perspective. Additionally, the categorisation and conceptualisation of the nodes in the value chain helps in identifying the areas of the region's food system. The value chain can also be understood as a vehicle that introduces new forms of production, technologies, logistics, labour process and organisational relationships and networks (Trienekens, 2011). The value chain is also characterised by vertical and horizontal relationships between and among actors in the value chain. Information, technologies and skills can flow in adequately developed vertical and horizontal networks whereas the smooth flow of these may be hindered in poor developed value chains.


Figure 12. Agricultural and food value chain for Kitwe city region food system

With regard to the core and peripheral region agricultural and food value chain, the food manufacturing or processing companies additionally include nut products and millers of maize while trading include warehouses, wholesalers, specialised chain stores, municipal managed markets and community markets.

The agricultural and food value chain for the Kitwe region food system is both a policy and economic unit of analysis for individual or a group of commodities primary among is maize. The commodities either generate or are tied to relationships between networks of input and capital suppliers, commodity producers, traders such as marketeers, processors and distributors. These networks define areas of the agricultural system that define the agricultural and food value chain.

The value chain in Figure 12 is also a conduit through which information on inputs, technologies and consumers preferences are transmitted to producers, processors, traders and service providers; finances such as credit, working capital and revenues are transmitted from institutions and value chain actors to producers, traders, processors and retailers; agricultural, processing and transportation technologies circulate among actors in the value chain. Even though a larger component of the actors at the lower end of the value chain are small producers, resource poor with little access to technology,

the flows in the value primarily constitute information on inputs, finances in terms of revenue and technologies in form of low cost materials and use of agrochemicals.

One key aspect of consideration for this value chain is its typical value chain linkage that include input supply such as through the government administered FISP programme, production of food crops such as maize, primary processing such as shelling and packing, transportation from farm to the market, storage at various stages of the value chain, processing such as production of maize meal, wholesale, retail and consumption. The export of maize meal to southern DR Congo (i.e. Lubumbashi) is a major stage for maize which is not the primary intention of the producer nor processor.

6.3. INPUT SUPPLY AND FOOD PRODUCTION (CSO, 2012)

6.3.1. Agricultural input supply

Agricultural inputs are supplied by a varied number of private entities that include Agro-dealers such as RIA-Agro, Swinney, Vinco and Farm City. These Agro-dealers are stockists for seed companies that include Zamseed, Seedco, MRI-Syngenta, Pioneer, Panar, Klein Karoo and Monsanto. Manufacturers of Agro-chemicals that is, pesticides (herbicides, insecticides and fungicides) also have presence in the entire CRFS. Among such firms is ATS Zambia headquartered in Ndola.

Small scale farmers have access to subsidised government inputs through the Farmer Input Supply Programme (FISP). The inputs are currently limited to basal and top dressing fertilizer as well as seed (maize, groundnuts, common beans, sunflower and soybeans). These inputs are distributed by Niyombo Investments to various districts after which local transporters deliver them to farmers in various localities, that is, agricultural camps.

6.3.2. Food security situation

The job losses in the mining and manufacturing sectors impact negatively on the livelihoods of most families in low and medium income groups especially with the annual food inflation rate (Table 15) at 23.4% in November 2015 compared to 16.2% for October 2015 (CSO, 2015).

Division	20	14		2015									
DIVISION	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Food & non- alcoholic beverages	3.8	4.0	3.8	3.9	3.7	3.7	3.7	3.7	4.0	4.0	4.2	8.3	12.0
Housing, water, electricity, gas & other fuels	1.5	1.5	1.4	1.3	1.2	1.1	1.3	0.7	0.7	0.7	0.7	1.6	2.0
Health	0	0	0	0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1
Education	0.3	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2
All items	8.1	7.9	7.7	7.4	7.2	7.2	6.9	7.1	7.1	7.3	7.7	14.3	19.5

Table 15. Percentage point contribution of selected items to overall inflation (CSO, 2015)

NB: All items includes other contributors than just the selected divisions.

Since the food region is more of a mining area and not a major food producing region, its food security is closely interwoven with the prevailing national economic environment and the economic circumstances in the mining sector as influence by global trends in metal prices. Changes in global demand and the price of copper on the London Metal Exchange (LME) bearing on the economic wellbeing of Kitwe.

The food region has been food secure for the past five years as regards maize. This is because maize production has been above the estimated national consumption of 1.2 million metric tonnes. Despite this, however, there exists a lot of potential for better maize yields as production and productivity levels for both Kitwe and the Copperbelt Province (CRFS under consideration) are still below average as per hybrid seed potential.

Nutrition security has however, been the major challenge not only for the Kitwe City Region Food System but for the country in its entirety. Diversification in both crop and livestock production is still in its infancy. It therefore, remains that the CRFS and the country in general is yet to attain nutrition security.

6.3.3. National food production for selected crops

Nationally, total quantity of maize produced increased from 1.9 million metric tons (MT) in 2005/2006 season to 2 million MT in 2008/2009 season. The proportion of agricultural households producing local maize declined from 64% in 20005/2006 season to 61% in 2008/2009 season, while the proportion of agricultural households producing hybrid maize increased from 27% to 30%. It is worth noting that urban areas experienced a decline in the proportion of agricultural households producing maize, in particular local maize (falling from 57% in 2005/2006 season to 45% in 2008/2009 season). The total quantity produced in urban areas fell from 231,000 MT to 219,000 MT.

Copperbelt Province had one of the largest declines in the quantity of maize produced, from 206,000 MT in 2005/2006 season to 161,000 MT in 2008/2009 season, followed by Lusaka Province, down from 92,000 MT in 2005/2006 season to 74,000 MT in 2008/2009 agricultural season.

Cassava: The national proportion of agricultural households growing cassava increased from 28% in 2005/2006 season to 30% in 2008/2009 season, with total production in terms of 90Kg bags increasing from 2,943,000 in 2005/2006 season to 3,328,000 in 2008/2009 season.

Millet: The proportion of agricultural households growing millet remained at the same level, although total household production increased from 264,000 for 90Kg bags in 2005/2006 season to 303,000 for 90kg bags in 2008/2009 season.

Sorghum: The proportion of agricultural households growing sorghum remained at the same level, with total production falling slightly between 2005/2006 season and 2008/2009 season. In 2008/2009 season, agricultural households produced 223,000 of 50kg bags, compared to 230,000 of 50kg bags produced in 2005/2006 season.

Rice: The proportion of agricultural households growing rice remained at the same level over time, with total production increasing from 311,000 of 90 Kg bags in 2005/2006 season to 359,000 90kg bags in 2008/2009 season. In both 2005/2006 and 2008/2009 seasons, Western and Northern Provinces had the largest proportion of agricultural households producing rice; the proportion in Western Province increased from 11% in 2005/2006 season to 17% in 2008/2009 season, while the proportion in Northern Province increased slightly from 6 to 7%. Production in Western Province increased from 98,000 of 90 Kg bags in 2005/2006 season to 130,000 of 90 Kg bags in 2008/2009 season, while in Northern Province production increased from 128,000 to 170,000 90 Kg bags during the same period.

6.3.4. Crop, livestock and poultry production

6.3.4.1. Crop, livestock and poultry production in the core and peripheral region

The Copperbelt Province produces Cassava, Cow Peas, Groundnuts, Finger Maize, Millet, Mixed Beans, Paprika, Rice, Wheat, Sorghum, Soya Beans, Sunflower and Sweet Potatoes as major crops. Others are popcorn, Irish potatoes and Bambara nuts. Horticultural crops include oranges, mangoes, lemons, guavas, and avocado. Vegetables include cabbage, rape, Chinese cabbage, tomatoes, onions, green pepper and green maize.

The production of cereals, cassava, sweet potatoes and livestock and poultry by large scale and small/medium scale farmers and producers is in Table 16.

		Area	Harvested (ha)	Production (MT)			
Producer	Crops	2001-	2002-	2010-	2001-	2002-	2010-	
		2002 ^{ab}	2003°	2011 ^d	2002 ^{ab}	2003 ^c	2011 ^d	
	White	8,536			24,423			
Larga ceala (CSO	Maize	(17.5%)			(12.1%)			
	Groundnuts	8 (11.1%) ¹			2 (0.5%)			
2004)	Soya beans	5 (0.4%)			7 (0.04%)			
	Sunflower	32 (6.9%)			7 (3.8%)			
	Maize	30,383	52,378	93.079	44,496	71,337	221,137	
		(4.7% ¹)		(7.0% ¹)	(6.7%)	(8.2%)	(8.1%)	
	Sorghum	4,878	5,045	1,094	2,050	3,933	591	
		(14.4% ¹)	(11.4% ¹)	(4.4% ¹)	(11%)	(14.1%)	(5.0%)	
	Rice	26.1(0.20/1)		5.4		29.4	11.3	
Small/modium		20.1(0.270)		(0.00 ¹)		(0.2%)	(0.00)	
	Millet	24E(0.49(1))	308	266.4	01/0 20/)	1,419	251.8	
$2004 \ 2015)$		243(0.470)	(0.5% ¹)	(0.6% ¹)	81(0.270)	(4.0%)	(0.8%)	
2004, 2013)	Sunflower	$22(0.1\%^{1})$		1.4	7(0,1%)		0.2	
		22(0.170)		(0.00 ¹)	7(0.170)		(0.00)	
	Groundnuts	5,005	3,658	10,709.2	3,562	2,696	6,655.5	
		(3.6% ¹)	(3.2% ¹)	(5.0% ¹)	(4.7%)	(4.0%)	(6.9%)	
	Soya Beans	171/2 50/11	421	402.6	77	199	541.5	
		I/I(2.3/0)	(4.9% ¹)	(1.7% ¹)	(2.3%)	(2.2%)	(3.2%)	

Table 16. Production of cereals in the Copperbelt Province

Cassava	1,394	4,564	2,723	565	2,839	153.1 ² ;
	(0.5% ¹)	(2.0% ¹)	(0.6% ¹)	(0.2%)	(1.5%)	83.1 ³
Sweet	3,244	4,029		10,528	12,341	
Potatoes	(14.1% ¹)	(14.4% ¹)		(21.7%)	(18.6%)	
Irish		144			240	
Potatoes		(37.1% ¹)			(35.8%)	
Mixed		1,133	1,559		495	776.8
Beans		(2.6% ¹)	(2.3% ¹)		(2.5%)	(2.2%)
Cow Peas		53			60	
		(0.9% ¹)			(2.7%)	
Paprika		43			4.9	
		(3.7% ¹)			(1.0%)	

NB. ¹/: area planted; ²/: Cassava chips produced; ³/: dry Cassava in storage

With regard to the peripheral region (Figure 13), Mpongwe is regarded as the leading district in terms of agricultural production. The district produces substantial amounts of Wheat, maize and soybeans. Major livestock include cattle, sheep, goats, chickens and fish. Masaiti and Lufwanyama are also major agricultural districts that are into the production of maize and groundnuts. Livestock include pigs, goats and cattle. The other districts, that is, Ndola, Luanshya, Mufulira, Kalulushi, Chingola and Chililabombwe also contribute to the food basket through considerable production of maize, soybeans, groundnuts and beans with Chililabombwe providing a huge outlet to the Congolese market.



Figure 13. Movement of foods (processed and unprocessed) in Kitwe city region food system; 1: core region, 2: peripheral, 3: other region. Core region is not completely influenced by the peripheral region as the other region can interact with the core region with

Mango remains the major fruit that the Kitwe CRFS produces. Other prominent fruits include Citrus (mostly orange and lemon), banana and guava.

The main pests and diseases attacking crops in the region are army worms in maize, aphids in cabbage and rape, diamond-back moth and cabbage rot in cabbage, red spider mites and leaf blight in tomatoes. Horticultural crop production is primarily affected by frost which is moderate with the major impact arising from pollution by industrial fumes (Table 17).

		Severity	Actio	on	Name
Crop Affected	Major Pests & Diseases, Disorders	scale- Extreme, Major, Minor,	Already Taken	Additional Needed	Location of Adverse Effect
Maize	Armyworm	Major	Awareness campaigns Controlled the pests with cypermethrin and Lambda provided by the Ministry	Strengthen early warning systems	Mpongwe, Masaiti, Luanshya, Ndola, Kitwe
Cabbage & Rape	Aphids	Minor	Use of Malathion or Pirimicarb	integrated pest management capacity building	All districts
Cabbage	Diamond- back-moth, cabbage rot	Minor	- Spraying with Metamidophos -Adequate & regular irrigation	As above	All districts
Tomato	Red spider mites, Leaf blight	Minor	Morocide use advise Advised to spray with SAAF	As above	All districts
Horticultural	Frost	Moderate	Daily early & late watering advised	Radio Awareness Programs	Masaiti, Mpongwe
Horticultural	Industrial fumes	Major	Polluters (NFCA, CCS) made aware	Sensitisation & mitigation	Chambeshi

Table 17	A Antonia	a a a tra a una al	diananan	au a d tha air		a atiana in	+1	au and se	la l	
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6.3.4.2. Crop, livestock and poultry production in the core region

The district is in Agroecological Region III receiving average rainfall of over 1200mm per annum. There 265 farmer cooperatives and 12,080 small holders farmers³. The major crops cultivated are maize, sweet potatoes, cassava, groundnuts and vegetables. Maize however, is the main cash crop cultivated in the district by farmers as presented in Table 18. Major livestock reared are chickens, cattle, goats and sheep (Chabalengula, 2015).

³ District Agriculture Coordinator. Personal communication

Table 18a. Field Crops (Source: Chabalengula, 2015)

CROP	# Farmers	Ha.	Market Outlet	Comments
Maize	7676	3838	FRA/ Millers	April rains spoiled the grain. Household food
				security is, however, still assured.
Sorghum	126	63		Home consumption
G/nuts	1786	223.25	Chisokone/	Sell whilst fresh
			Chikwepe	
F/Beans	176		Chisokone	Beans from Northern province create colossal
				competition.
S/Beans	429	106	Millers/ Astra	Farmers have to pool their produce to meet
				demand. Production still low.
Sweet	1933			Mainly for home consumption
potato				
Cassava	55			Mostly for home consumption.

Table 18b. Horticultural Crops-Fruits (Source: Chabalengula, 2015)

Fruit Trees	# Growers	Market Outlet	Comments
Oranges	82		Home consumption
Bananas	107	Chisokone	Supply not good enough on the market.
Mangoes	225	Chikwepe, Chisokone,	Out of season.
		Roadside.	
Guava	27		Home consumption
Lemons	138	Chisokone/ Chikwepe	Have stable demand.
			They ,however, fetch a low price due to
			customer preferences
Avocado	123	Chisokone	Fetch reasonable price and demand.
Paw – paw	132		Home consumption

Table 18c. Horticultural Crops-Vegetables (Source: Kitwe District Agriculture Office, 2015 Quarterly Report; Chabalengula,2015)

Туре	#	Ha.	Market Outlet	Comments						
	Growers									
Cabbage	140	18.5	Chisokone/Chikwepe/Bulangililo	Doing fairly fine.						
Rape	644	29.25	Chisokone/Chikwepe/Bulangililo	Most preferred vegetable by both						
				growers and consumers						
C/cabbage	106	11.25	Chisokone/Chikwepe/Bulangililo	Doing fairly fine.						
Spinach	-	-	Chisokone	Coming up.						
Carrot	-	-	Chisokone	Gathering popularity among farmers.						
				Doing fine in Kitwe soils.						
Tomato	276	25.5	Chisokone/Chikwepe/Bulangililo	Doing fine despite an unstable price on						
				the market.						
Onion	127	14	Chisokone/Chikwepe/Bulangililo	Quite common on the market and have						
				high demand.						
Egg Plant	89	1.75	Chisokone/Chikwepe/Bulangililo	Found in smaller quantities.						
Okra	93	8.25	Chisokone/Chikwepe/Bulangililo	Has a rather fair demand on the market.						

6.3.4.3. Livestock and poultry production

National livestock and poultry production

Nationally, agricultural households raise cattle (Table 19) for different purposes that include production of meat, milk, draught power, skins and for aesthetic value among other uses. Various types of production systems, namely industrial-intensive, semi-intensive, extensive/pastoral, free-range and backyard systems are used to raise cattle. Tick control on cattle is carried out in many ways that include dipping, spraying, pour-on, hand dressing, traditional and injection. Challenges reported by cattle rearing households included diseases, lack of livestock extension services, inadequate pasture, distance to water points, distance to dip tanks, lack of credit facilities, lack of market, theft, lack of access to veterinary drugs and distance to service centres (CSO, 2015).

Producer	Livestock & Poultry	Nu	Number Raised						
Froducer	LIVESLOCK & FOULLY	2001-2002 ^{ab}	2002-2003 ^c	2010-2011 ^d					
	Beef Cattle	36,672							
	Dairy Cattle	9,318							
	Traditional Cattle	1,866							
	Pigs	30,370							
Largo scalo a	Goats	1,368							
Laige scale	Sheep	1,431							
	Wild Game	5,298							
	Chickens	2,539,260							
	Ducks	903							
	Geese	1,476							
	Cattle	9,753	9,799	28,763					
Small/modium scalo	Pigs	10,769	7,460	45,092					
bcd	Goats	33,786	27,383	93,967					
	Sheep	2,636	2,822	3,492					
	Chickens	276,905	482,048						

Table 19. Livestock and poultry production

NB. ^a/: CSO (2004); ^b/: CSO (2003); ^c/: CSO (2004); ^d/: CSO (2015)

Livestock and poultry production in the core and peripheral region

The Ministry of Agriculture indicated in 2012 that the total population of large and small livestock is estimated at 219,216 (i.e. of cattle, goats, pigs and sheep). Large livestock made up 32% while small livestock constituted 68% of the estimated total population (Table 20).

District	Total Cattle	Goats	Pigs	Sheep	Fowls
Mpongwe	34,704	28,401	12,097	4,021	82,414
Kalulushi	8,000	5,000	15,000	300	52,000
Kitwe	11,834	4,712	28,478	2,678	917,780
Chililabombwe	1,407	4,844	3,702	139	2,092
Luanshya	3,024	2,335	2,589	313	876,756
Mufulira	2,678	11,585	9,782	205	484,884
Masaiti	4,302	3,126	1,595	301	13,866
Ndola	3,926	2,843	4,755	585	159,038
Totals	69,875	62,846	77,998	8,542	2,588,830

Table 20. 2012 livestock census in the core and peripheral region

Common scheduled diseases include east coast fever, anaplasmosis, black quarter, heart water, lumpy skin disease, tuberculosis and babesiosis in cattle. In avian notable scheduled diseases include fowl pox, Newcastle and gumboro.

Non-scheduled diseases experienced in cattle vary from malnutrition, retained placenta, mastisis, abortion, snake bites, dystokia, vitamin deficiency, poisoning and senkobo. Non-schedules diseases experienced among various avian species are usually cocciosis, omphalitis, fowl pox, enteritis and fowl cholera.

6.3.4.4. Household involvement in agriculture and agroforestry

In the small and medium scale farming out of a total of 364,654 rural households, 96.9% produced crops, 23.6% reared livestock and 78.7% poultry in 2001/2002. In the 2002/2003 farming season, there were a total of 66,909 rural households out of which 94.5% were involved in crop production, 9.5% reared livestock, 64.9% were in poultry and 0.5% were involved in fish farming. In the 2002/2003 season, 1,484 households reported practising agroforestry whilst 3,714 households indicated having irrigated their maize fields (Figure 14).

In the period 2010/2011, an estimated 93,797 households (Figure 11) took part in farming out of which 76.9% (72,162 households) of producer households were male headed while 23.1% (21,635 households) were female headed. This contrasts with 34,654 households out of which 74.2% (25,713 households) male and 25.8% (8,941 households) female headed households were involved in agriculture in the 2001/2003 farming season. The number of households increased from 34,654 in 2001/2002 to 66,909 in 2002/2003 and 93,797 households in the 2010/2011 farming season. However, the percentage of male headed households was marginally less in 2010/2011 as compared to the 74.2% male headed households obtained in 2001/2002. Female headed households also declined in 2010/2011 compared to the 25.8% obtained in 2001/2002.



Figure 14. Crops produced and households involved in crop production on the Copperbelt in 2001/2002, 2002/2003 and 2010/2011 farming seasons

However, the number of both male and female headed households has been increasing in the three farming seasons. The number of producers is high for maize production compared to other crops followed by groundnuts, sweet potatoes, cassava and sorghum.

6.3.5. Source and availability of information on agricultural commodity prices

Nationally, 1,012,387 agricultural households received information about maize market prices. Sources of information were a fellow farmer or neighbour (35.1%), 29.3% received information through radio programs and 7% through a trader or marketer. Farmers accessing information about market prices for livestock were 320,010 through farmer or neighbour (40.9%), 15.8% through a trader or marketer and 13.4% through radio programmes.

An estimated 381,727 agricultural households acquired information about the market prices for poultry through farmer or neighbour (47.9%), a trader or marketer (17.9%) and from the market place (13%). About 215,108 agricultural households received information about the market price for fish. Those that received it through a trader or marketer constituted 31.6%, farmer or neighbour (28.4%) and the market place (22%).

6.3.6. Management of agriculture

The core and peripheral region food system has 10 districts (Chililabombwe, Chingola, Kalulushi, Kitwe, Luanshya, Lufwanyama, Masaiti, Mpongwe and Ndola). Every district is divided into agricultural blocks and camps. In 2014, the region had 44 agricultural blocks, 156 agricultural camps, 156 Camp Agricultural Committees, 3 farmer training centres and one farm institute (Kitwe DACO, 2015). The basic agricultural block and camp network management structure is in Figure 15.



Figure 15. Agricultural block and camp management structure

Farmer training centers are for training of farmers in improved farm practices and commodity demonstration. Farm institutes on the other hand are for in-service training of extension staff, and also provide higher level training to improved farmers and commodity demonstrators.

The core region is divided into three agricultural blocks and nine agricultural camps that produce the listed crops and livestock in Table 21.

Block	Camp	Crops	Livestock
Kafue	Kamfinsa	Vegetables, Maize, Soya beans, Groundnuts,	Cattle, Pigs Chickens
		Sweet Potato	
	Mwekera	Maize, Vegetables, Soya beans, Groundnuts,	Cattle, Pigs, Chickens
		Sweet Potato.	
	Kakolo A	Maize, Soya beans, Groundnuts, Sweet Potato,	Cattle, Pigs, Chickens.
		Citrus.	
	Kakolo B	Maize, Soya beans, Groundnuts, Sweet Potato,	Cattle, Chickens
		Citrus.	
	Mufuchani	Maize, Soya beans, Groundnuts, Sweet Potato.	Cattle, Chickens
Luangwa	Luto	Maize, Soya beans, Groundnuts, Sweet Potato	Cattle, Sheep, Citrus,
			Pigs, Goats
	Chisokone	Vegetables	Fish. Chickens,
Itimpi	Luongo	Maize, Vegetables	Chickens Pigs
	Twatasha	Maize, Vegetables	Chickens

Table 21. Agricultural subdivisions, crops and livestock produced in each camp in the core region

6.3.7. Factors determining compliance and indicators of food production

6.3.7.1. Factors determining compliance

- i. Number of farmers in the region practicing sustainable agriculture methods;
- ii. Level of multi-sector participation in agriculture production (policy harmonisation);
- iii. Availability and affordability of hybrid and other improved varieties (crops, livestock and fisheries);
- iv. Social situation of people working in the agriculture sector.

6.3.7.2. Indicators of agricultural production

- i. Number of farmers using improved varieties;
- ii. Income distribution;
- iii. Welfare index;
- iv. Share of persons employed in agriculture sector;
- v. Crop yield in the region;
- vi. Area under cultivation;
- vii. Number of different crops under cultivation;
- viii. Availability and affordability of food crops on the market;
- ix. Malnutrition levels in the region.

6.3.8. Aspects that link production to other aspects of the food value chain

- i. Geographical location some areas are more productive than others. This makes the region interdependent. Therefore, links shall always be there;
- ii. Economic factors some areas in the region provide a suitable market for agriculture crops due to population dynamics. These areas are also highly industrialized hence providing an opportunity to process the food.

6.3.9. Challenges in input supply and food production

- i. Variability of water quality driven by mining effluents, harmful biological agents, and other suspended solids;
- ii. Post-harvest losses leading to reduced availability of food stuffs;
- iii. High cost of agricultural inputs for small resource poor producers;
- iv. Poor storage facilities;
- v. Availability and access to reliable data and information;
- vi. Poor road infrastructure impacting production, processing, marketing, catering and retail;
- vii. Harmonisation of legislation and outdated city by-laws;
- viii. Loss of indigenous knowledge and systems for seed storage, production, processing and storage;
- ix. Inadequate and poorly coordinated extension services;
- x. Impact of climate change and variability resulting in low rainfall;

- xi. Non-assurance of reliable meteorological data;
- xii. Lack of rain water harvesting capacity and technical services;
- xiii. Inadequately developed irrigation facilities;
- xiv. Lack of access to finance;
- xv. Increase in number of counterfeit products on the market.

6.3.10. Sources of data on input supply and production

Data can be obtained from organisations or sources listed below:

- i. Central Statistical Office;
- ii. Ministry of Agriculture (MoA);
- iii. Ministry of Fisheries and Livestock (MFL);
- iv. Competition and Consumer Protection Commission (CCPC);
- v. National Traders and Marketeers Association of Zambia (NATMAZ);
- vi. Seed Companies (Seedco, Zamseed, MRI-Syngenta, Pioneer, Panar, Monsanto, Kamano, Klein Karoo);
- vii. Zambia Revenue Authority (ZRA);
- viii. Plant Quarantine and Phytosanitary Services (PQPS);
- ix. Seed Control and Certification Institute (SCCI);
- x. Zambia Bureau of Standards (ZABS);
- xi. Zambia National Farmers Union.

6.4. FOOD STORAGE, PROCESSING AND MANUFACTURING

6.4.1. Food storage

In terms of food production, storage is a very important component in the production process. Without adequate and efficient food storage facilities, the likelihood of food wastage is almost inevitable. It is therefore necessary that food storage facilities are considered to avert food going to waste. Various food stuffs require different storage facilities.

Food storage takes place has two dimensions in farmer households. It takes place in a more traditional way as well as using improved storage facilities. Out of the estimated 1,430,924 agricultural households, only 113,126 owned the improved type of storage facilities to store their grains, representing 7.9% of the total out of which the core and peripheral region has 7,301 households that owned improved storage facilities (CSO, 2015).

6.4.1.1. Storage by producers, collectors and middlemen

Sun drying, storage in unimproved storage shelters, a combination of pre-cooking and sun drying and burying are some of the traditional storage methods. Maize, vegetables and sweet potatoes can be stored through sun drying. Maize is heaped on a prepared grass bed and left in a cleared patch of the

field to dry and can be later collected and placed in a sheltered place just before the onset of rains. Leafy vegetables such as pumpkin leaves can be cleaned, peeled and sun dried or pre-cooked and sun dried for use within the season or at any other time of the year. Other vegetables are sun dried and pounded then packed in a clean container and stored. In some cases, some tubers, roots or bulbs are dug up but left buried in the soil for use at a later stage. Sweet potatoes are either pre-cooked then sun dried or are sliced and sun dried raw.

Traditionally dried stored foods are commonly sold in the markets of the CRFS and transported across regions. These contribute significantly to the foods available in the food system. These are highly diverse foods ranging from dried fish, meat, sweet potatoes, leafy vegetables, wild mushrooms and wild vegetables.

6.4.1.2. Storage by wholesalers, transporters and retailers

Short and medium term storage characterises food storage by wholesalers, transporters and retailers which is pre-dominated by refrigeration of crops and livestock products. Wholesalers primarily store processed food products for sale to retailers and sometimes the same wholesaler participates in the market as a retailer, Mama Africa in Kitwe is an example. Transporters transport unprocessed and processed food products and the foods that are subject to in-transit storage are usually processed foods. This takes placed for limited periods of time and are necessitated either by vehicle stoppages rather than as a planned activity.

Retailers operate at mainly two scales, the small scale retailer such as marketeers and more formalised and licensed retailer. Retailers such as marketeers who may also operate as middlemen, may store their produce on the stand where products are left overnight covered in plastics or sacks or left in the open without being covered. This applies to roadside markets where water melons and potatoes can overnight in a container used as a measure for potatoes. Refrigeration facilities are usually not available to retailers that deal in perishable products such as vegetables such as tomatoes. In some cases leafy vegetables such as rape can be stored overnight on a sack and sprinkled with water to avoid drying.

Meat products and fish sold in markets and streets are usually intended to be sold the same day that it has been procured from a wholesaler, butchery or retailer. In some instances, foods that have started to waste can be noticed from the retailers that do not have refrigeration facilities. However, the sale of products such as meat and fish in the street and unlicensed points is prohibited by legislation. The Public Health Act stipulates distribution and storage of quality food and clean environments as a basis for good health.

Most formal consumer outlets and supermarkets have refrigerated facilities that allow storage of perishable products for longer periods of time.

The city of Kitwe has quite a number of food storage facilities that are able to store various kinds of food stuffs. In terms of food storage facilities, various types of storage facilities exist. In terms of maize production, a number of millers have established maize storage facilities. Mpongwe Milling has one of the maize largest storage facilities that is located in the light industrial area in Kitwe. The other milling

companies do also have storage facilities such as Jamas Milling, HM Milling and other milling companies in Kitwe. However, there are other milling companies that do not have production facilities within Kitwe and just bring finished products such as mealie meal which is usually transported on a regular basis.

It should also be mentioned that most wholesale shops have storage facilities where they keep various food products. In the past, the city of Kitwe used to have an Abattoir but this has since been closed. The lack of an Abattoir means it becomes very difficult to ensure that all meat slaughtered in Kitwe is healthy and done under hygienic conditions. The lack of an Abattoir has led to the slaughter of animals from other districts and transported in refrigerated vehicles.

6.4.2. Processing and manufacturing

Most processing and manufacturing industries on the Copperbelt in general have faced a number of operational challenges leading to some of them collapsing as a result of the difficult business environment. This has been compounded by the fact that most food processing industries are located in Lusaka while a few are located in Ndola. The high cost of production and the dependency on imports from the region especially South Africa has made it even more difficult local food processing industries to thrive. The notion that most local products are of poor quality compared to imported products have not made the situation even worse. In Kitwe for example, most processing industries have collapsed with the most recent one being Speciality Foods which used to manufacture various baking and other food stuffs.

A study conducted by Emongor and Kirsten (Emongor & Kirsten, 2009) has revealed that the expansion of South African supermarket chains in the SADC and in other African countries is seen as offering an opportunity to suppliers (farmers and food processors) in the host countries to increase their output and income, as supermarkets offer a ready market for domestically produced produce. Several issues that were raised include the sourcing strategies of the South African supermarkets, which may exclude local producers, especially small-scale farmers and processors. These issues relate to high transaction costs, which make it difficult for supermarkets to do business with small-scale farmers and small-scale food processors.

However, it is important to note that despite the collapse of a number of industries, the core and peripheral region still has a number of food processing industries though on a small scale and are scattered around the cities with exception of Masaiti, Mpongwe and Lufwanyama. This includes mineral water processing industries, beverage manufacturing, maize processing industries, milk processing and a number of bakeries. The other notable ones include supermarkets such as Shoprite and Pick N Pay are also involved in processing various meat products in their butchery sections. Maize milling and meat processing are probably the largest food processing activities that include the production of maize meal, sausages and other meat products. The main milling plants include Antelope and Mpongwe while Zambeef Products Plc is the largest specialised meat processing company.

6.4.3. Factors determining compliance and indicators of food storage, processing and manufacturing

6.4.3.1. Factors that determine compliance

- i. Level of investment in technological advances in terms of tools and equipment needed in food production;
- ii. Level of Social capital development in food processing dynamics;
- iii. Level of adherence to policy and other regulations that govern the food processing industries even such as fortifying certain processed foods, standardization in quantities and measures.

6.4.3.2. Indicators of food processing

- i. Share of processed food in relation to Unprocessed food on the market ;
- ii. Number of processing facilities in the region under review;
- iii. Number of persons employed in the food processing industries ;
- iv. Income levels and welfare index.
- ٧.

6.4.4. Aspects that link storage, processing and manufacturing to other aspects of the food value chain

- i. Economic factors (*demand and supply*);
- ii. Environmental factors;
- iii. Geographical factors.

6.4.5. Challenges in food storage, processing and manufacturing

- i. Variability of water quality driven by mining effluents, harmful biological agents, and other suspended solids;
- ii. Post-harvest losses leading to reduced availability of food stuffs;
- iii. Inadequacy in process (value adding) infrastructure;
- iv. Poor storage and transport facilities;
- v. Availability and access to reliable data and information;
- vi. Poor road infrastructure impacting production, processing, marketing, catering and retail;
- vii. Absence of tax incentives for agro processing and manufacturing.

6.4.6. Sources of data on storage, processing and manufacturing

- i. CSO;
- ii. Department of labour;
- iii. Local government;
- iv. Chamber of commerce.

6.5. FOOD WHOLESALE AND DISTRIBUTION

6.5.1. Background to food wholesale and distribution

In as far as Food wholesale and distribution is concerned, Agriculture has always played a critical role in most economies and food sectors of developing countries as being a major source of food supply and household income. This has however been characterized with high food distribution margins and seasonal price variability especially after the introduction of market reforms in most developing countries, including Zambia.

The major food distribution system has been characterized with Cooperatives as well as Marketing boards on the Copperbelt. The Agricultural marketing boards have existed in Zambia, as in many other former British colonies, since 1936 in one form or another, characterized with strong governmental control and price subsidization (Wichern *et al.,* 1999).

Up until 1992, the purpose of the marketing board was to provide cheap food to the urban markets while paying fixed prices to farmers for produce, especially maize. Farmers along the line of rail were assured of a market for their produce, but more remote farmers also received the same price, although their marketing margins were greater, resulting in lower net revenue. All farmers enjoyed price and procurement guarantees, with preference for maize production.

According to Hubbard and Onumah (2001), cities world over have experienced significant rapid growth at a faster rate than the development of policies to cope with food supply and distribution. The Copperbelt Province of Zambia is not exempt from this assertion, as many of the roads, market places, sewer and power are in some cases inadequate to meet the food wholesale and distribution demands. This is compounded by the fact that the livelihoods of most rural livelihoods largely depend on the growing and selling of different types of crops, especially fresh produce growers.

Although there is very little documentation to this effect, the Copperbelt region food and distribution system is characterized by the following Food Supply and Distribution Systems (FSDS):

- 1. A sub-system for supplying food to cities, which consists of infrastructure and activities linked to production, assembly, selection, processing, storage and transport up to an urban (consumption) center; an urban food distribution sub-system, which consists of formal, informal, traditional and modern activities and infrastructure involved in food distribution within cities (intra-urban transport, wholesale and retail markets, which may be specialized, planned or spontaneous markets; shops of various kinds, supermarkets, hypermarkets, shopping centers; restaurants, snack bars and street vendors).
- 2. Geographical areas covered by an FSDS which include:
 - a) *Regional*, comprising the principal areas on which the city relies for supplies of food and water;
 - b) *Metropolitan*, comprising peri-urban areas used for food production (crops, livestock and aquaculture), wholesale markets, slaughterhouses, and city markets, etc.
 - c) *Urban*, including areas used for urban agriculture, major retail food markets, hypermarkets, shopping centers,
 - d) *Local*, including all the food sales outlets serving the inhabitants of a specific neighborhood (permanent and itinerant neighborhood markets

Furthermore, the region is characterized by a remarkably small food wholesale and distribution system. This is because Zambia's main production industry has for a long time been dependant on the mining of copper and other minerals. According to Larson (2014), copper mining and processing contributed about 34.1% of GDP in 2009.

However, Kitwe City, being the hub of the Copperbelt has quite a number of wholesale and food distribution points. The major food wholesale points for the core and peripheral region include *Zambeef Products Plc*, various *maize milling companies, fish selling companies, Parmalat Zambia Limited, beverages producers (such as Caribea Beverages Limited, National Breweries, Copperbelt Bottling Company) Atheneon,* and *bakers.*

On another scale, the food distribution points include municipal managed and community markets. These markets are usually supplied with food from farmers within and in the neighbouring towns and probably retail a larger component of the food produced in the region with the exception of livestock and poultry products.

6.5.2. Indicators of wholesale and distribution

Indicators for wholesale and distribution include:

- i. The number of registered Food Wholesale and Distributors in the region;
- ii. The number of market concentration or suppliers in relation to the registered industries;
- iii. The number of returns due to improper shipments and defective items;
- iv. The number of sector industries covered;
- v. The level of technological development and advancement in the distribution;
- vi. Customer satisfaction and retention ratings;
- vii. Geographical and area coverage by the distributors;
- viii. The number of distribution channels available.

6.5.3. Aspects that link wholesale and distribution to other aspects of the food value chain

- i. *Affordability* of the food products; includes pricing, product volumes and quality standards;
- ii. *Availability*; includes ability to control stock on hand, efficiency in distribution channels, proximity to key markets and a robust linkages between traditional retailers and wholesalers;
- iii. *Efficient Distribution* channels or *Transportation*; Includes good reliable and efficient transportation network;
- iv. *Health and Safety*; includes good storage and handling of the foods from the point of processing and manufacturing up to storage, transportation and final distribution;
- v. *Economic Aspects*; Includes issues of demand and supply;
- vi. *Legal Aspects*; includes issues of compliance to the Food Safety and Drug Act and other Bye-Laws;
- vii. Consumer Influences;
- viii. Retailer Influences;
- ix. Technological development;
- x. Education, Research and Development.

6.5.4. Challenges in wholesale and distribution

The wholesale distribution industry faces many challenges among many others such as the ones listed below:

- i. Inadequacy in process (value adding) infrastructure;
- ii. Poor storage and transport facilities;
- iii. Availability and access to reliable data and information;
- iv. Poor road infrastructure impacting production, processing, marketing, catering and retail;
- v. Unstable fuel prices;
- vi. Power challenges;
- vii. Inconsistent policies;
- viii. Proper and adequate storage facilities and warehouses resulting in post harvest losses;
- ix. Customer retention;
- x. Production challenges;
- xi. Climate change;
- xii. Poor road infrastructure impacting on the distribution;
- xiii. Availability and access to reliable data and information;
- xiv. High cost of rentals in improved market infrastructure;
- xv. Huge taxes levied or imposed by local authorities for goods in transit born by distributors/ traders.

The listed challenges can however be overcome through adopting novel methods of doing business and a positive mind-set. For instance, wholesale distributors need to recognize the fact that the days of solely delivering manufacturers' products to retail customers at a competitive price are gone. Today, wholesale distributors are business partners participating in traceability initiatives and employing operational mobility to meet customers' demands.

Looking near term, there would be need for wholesalers on the Copperbelt region to also consider evolving their business, providing more value added services and employing analytics to help drive new business endeavours and operational efficiencies. Looking into the future, it is hoped that the wholesale retail revolution, technological advances and business integration could so drastically disrupt the face of wholesale distribution that it becomes almost unrecognizable.

6.5.5. Sources of data on wholesale and distribution

- i. CSO;
- ii. PACRA;
- iii. Local Authorities such as the city councils i.e. Ndola and Kitwe;
- iv. Chamber of Commerce;
- v. Central Statistical Office;
- vi. Ministry of Agriculture (MoA);
- vii. Ministry of Fisheries and Livestock (MFL);
- viii. Competition and Consumer Protection Commission (CCPC);
- ix. National Traders and Marketeers Association of Zambia (NATMAZ);
- x. Zambia Revenue Authority (ZRA);
- xi. Zambia Bureau of Standards (ZABS);
- xii. Zambia National Farmers Union.

6.6. FOOD MARKETING, CATERING AND RETAIL

6.6.1. Markets, market infrastructure and logistics

According to Chabalengula (2006), the management of market infrastructure for agricultural products in Zambia is governed by a number of laws as well as city by-laws. These pieces of legislation include Markets and Bus Stations Act No. 7 of 2007, the Local Government Act No. 9 of 2004, the Public Health Act, the Urban and Regional Planning Act No. 3 of 2015, the National Agricultural Policy 2004-2015 and city by- Laws. The National Agricultural Policy identifies lack of access to markets as being a major problem faced by producers in the agriculture sector. Thus, the policy assures development of infrastructure and promotion of Zambian agriculture products in the markets. National policy interventions have been provided with emphasis on market establishment to channel food commodities from surplus to deficit areas, long term strategic reserves to bridge the hunger period, reasonable income among farmers and dependable annual production of adequate supplies.

The core and peripheral region has a ranger of markets from roadside to formal municipal managed markets. Information on all markets in the region is not available in a single document. Some of these markets are large and have complex categories of retail/selling points which include those that are in Figure 16 whilst smaller markets are not as complex.

The market infrastructure in the peripheral region is not different from that in the core region and the whole region shares similar problems of management of markets by the municipal governments while roadside markets are largely informal just as are community markets where locally produced produce is traded within the residential areas including in stalls locally called "Tuntemba".



Figure 16. Structure of some large markets in the core and peripheral region. 1 = green section, well-constructed with tables; 2 = green pallets area where traders can display agriculture produce on pallets and on sacks on the floor; 3 = clothing, audio & video section sheltered but sometimes with stalls; 4 = sheltered furniture section; 5 = stalls for curios; 6 = hardware section with a combination of stalls & pallets even for farming inputs; 7 = stalls for clothing; 8= shops within the market, all assortment of processed foodstuffs & processed can be sold even in stacks on the floor.

Kitwe has a total of 26 with 3 main/retail and whole markets located near the CBD, Chimwemwe, Chamboli and Ndeke residential areas. Additionally, the city has 23 retail markets scattered over the city and which are currently being mapped. A range of foods are sold in these markets from unprocessed grains and cereals, vegetables, fruits, livestock, and edible wild tubers, bulbs and roots. Retail outlets, international and local, provide both locally produced and imported grains and cereals, vegetables, fruits, and animal products. The retail major retail outlets are supported by a number of roadside markets and Tuntemba which are largely informal.

Markets are serviced by all-weather roads that connect to other towns within the Kitwe city region. The city is well connected with a national trunk road cutting through the centre of town (Figure 17) as well as the national railway system that passes through the city.



Figure 17. Residential areas and road network in Kitwe (Source: Kitwe City Council)

In terms of transport services that aid movement of agricultural products and services, the city has a range of small and large scale transport firms that provide transport services to the agriculture sector within the city and in the city region. Additionally, both local and international transport companies provide transport services into and outside the city.

6.6.2. Retail

Crops, livestock and poultry products are sold at wholesale and retail. There are fewer wholesale outlets for crops produced within the core and peripheral region which have undergone basic primary processing. The main wholesale is either at the farm level or in major markets such as Main Masala Market in Ndola and Chisokone Market in Kitwe. Product prices at the farm and market are different primarily due to the market player, demand and the cost of transportation.

The retail market is significantly dominated by imported food products than regionally produced products. The retail sector is largely dominated by a town's market, followed by multi-national retail outlets and smaller locally owned retail outlets. The multi-national retail facilities are primarily concentrated in shopping malls while the smaller locally owned retail outlets are scattered all over town, including in residential areas. Other retail outlets that sell a large volume of products are the street vendors and informal trading points local y known as Tuntemba.

Even though there is a diversity of retail outlets (Figure 18 and 19) for agricultural products, there is a form of restrictions in the kind of products that informal traders deal in. For example, live chickens, eggs, fruits, vegetables, grains and tubers are sold by informal traders. However, dressed chickens, fresh processed meat products and fish are not commonly sold by informal traders due to issues of sanitation, storage and local legislations.



Figure 18. Location of agriculture input supply retail outlets (top) and spread of municipal managed markets (down)





Figure 19. Location of food retail outlets (top) and supermarkets and approximated extent of their catchments (down)

6.6.3. Food prices

From June to October (i.e. 3rd and 4th quarters of the year) maize grain marketing forms the major activity for most smallholder farmers. Government through the Food Reserve Agency (FRA) takes the lead in purchasing maize followed by private millers and individual briefcase businessmen. Additionally, government sets the year's maize floor price per 50Kg bag of maize grain. For example in the 2012 season, a 50Kg bag of maize was set at K65 as the floor price (Table 22). Private buyers were purchasing the same amount of maize at K40. The floor price is intended to protect the producer, however government is not able to purchase all the maize available on the market and pay the farmer on time. This compels some farmers to sell to private buyers albeit at a lower price than that offered by government. The floor price entails state regulation of maize prices, probably arising from the fact that government provides subsidized inputs to farmers.

The floor price for maize has a far reaching impact on the wholesale and retail part of the value chain. The selling price of a 50Kg bag of maize flour will largely be influenced by the floor price for that particular year. There are however minor variations in the selling price of maize flour which is the major staple food for many people in Zambia. Between December 2014 and December 2015, the average national price of a 25 Kg bag of breakfast maize meal has risen from K70.37 (Dec. 2014) to K82.22 (Dec. 2015), an increase of approximately 17% (CSO, 2015).

Dried beans was the product with the highest percentage increase at 48.5% between December 2014 (average national price per Kg of K12.14) and December 2015 (market price of K18.03 per Kg). Other products with percent changes above 10% are in Table 20.

The prices of other grains, vegetables, livestock and poultry products are in principle subject to market forces and large variations in prices are common even within the core region itself. Some of the products that have a large market price fluctuation are perishables such as tomatoes. Tomatoes delivered at the market by 10.00 hours may see the price significantly dropping to below 75% of the morning level by 16.00 hours of the same day. This is primarily driven by the fact that the region has inadequate storage facilities that would prolong the shelf life, maintain a reason price margin for the farmer and assure producers of good income from their produce.

Prices of food stuffs from outside the peripheral region, that are processed and packed, are largely affected by the prevailing exchange rates. The drop of the Kwacha against the US Dollar by more than 30% in 2015, relative to the January 2014 rate, has seen price increases of imported foods of more than 30%.

Description	Unit Of Measure	Dec 14	Jan 15	Feb 15	15-Mar	Apr 15	May 15	Jun 15	Sep 15	Oct 15	Nov 15	Dec 15	% Change Dec15/Nov15	% Change Dec15/Dec14
Breakfast Mealie Meal	25-Kg	70.37	70.69	71.00	70.61	69.74	69.35	69.18	69.16	71.92	79.63	82.22	3.25	16.84
Roller Mealie Meal	25-Kg	51.38	52.91	54.62	53.93	52.89	51.96	51.78	53.47	56.47	63.06	65.10	3.24	26.70
Maize grain	20-L tin	29.24	30.28	31.19	33.08	33.50	29.85	28.27	27.18	30.79	34.84	39.34	12.92	34.54
Bun	Each	0.71	0.68	0.68	0.70	0.72	0.72	0.70	0.78	0.91	1.01	0.97	(3.96)	36.62
Fritters	Each	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.59	0.83	0.87	0.84	(3.45)	44.83
Rump Steak	1-Kg	37.27	36.73	37.82	37.27	36.77	37.20	37.58	38.82	40.04	40.61	41.27	1.63	10.73
Brisket	1-Kg	30.46	31.05	31.14	30.92	30.74	30.84	31.06	31.36	32.25	32.91	33.48	1.73	9.91
Mixed Cut	1-Kg	29.25	29.63	29.67	29.60	29.29	29.44	29.55	29.78	30.54	31.25	32.21	3.07	10.12
T-bone	1-Kg	36.71	36.46	37.09	36.80	36.95	36.37	37.44	37.47	38.23	38.24	39.80	4.08	8.42
Chicken Frozen	1-Kg	20.12	19.95	20.06	20.85	21.14	20.74	20.78	21.21	23.74	24.97	25.34	1.48	25.94
Dried Bream	1-Kg	61.43	70.77	65.69	70.28	60.07	63.96	64.12	67.47	73.76	77.05	73.35	(4.80)	19.40
Dried Kapenta Mpulungu	1-Kg	95.50	98.19	90.26	100.54	105.39	101.60	100.04	87.50	102.87	106.12	114.62	8.01	20.02
Dried Kapenta Siavonga	1-Kg	103.54	111.08	108.39	109.42	110.19	105.36	108.88	104.02	115.97	119.33	122.55	2.70	18.36
Eggs	1-Tray	27.42	27.43	27.63	27.55	27.48	27.49	27.88	28.44	32.43	33.32	36.56	9.72	33.33
Cooking oil	20-ltr	37.85	37.46	37.37	36.96	37.25	37.35	36.92	38.19	46.31	54.73	55.74	1.85	47.27
Rape	1-Kg	4.10	4.58	4.44	4.23	4.59	4.57	3.98	3.68	3.94	4.59	5.18	12.85	26.34
Pumpkin Leaves	1-Kg	4.89	4.41	4.14	3.93	4.47	4.45	4.59	5.58	5.96	6.21	5.64	(9.18)	15.34
Cabbage	1-Kg	2.44	2.74	2.68	2.47	2.51	2.49	2.31	2.21	2.22	2.62	2.84	8.40	16.39
Tomatoes	1-Kg	5.64	6.34	6.32	5.63	4.86	5.72	5.82	5.11	5.06	5.73	6.14	7.16	8.87
Dried beans	1-Kg	12.14	13.27	13.17	13.43	13.35	13.47	13.42	13.37	14.59	16.63	18.03	8.42	48.52
Sugar	2-Kg	17.93	17.84	18.15	17.80	18.02	18.22	18.63	18.66	19.62	21.42	22.05	2.94	22.98

Table 22. National average prices for selected agricultural produce, livestock and poultry products

Source: CSO (2015)

6.6.4. Indicators of food marketing, catering and retail

- i. Number of registered marketing catering and retail;
- ii. Issuance of business licences in marketing, catering and retail;
- iii. Increase and improvement in marketing, catering and retail infrastructure;
- iv. Number of people employed in marketing, catering and retail;
- v. Access to financial services.

6.6.5. Aspects that link marketing, catering and retail to other aspects of the food value chain

- i. Accessibility of markets and retail outlets;
- ii. Storage infrastructure in markets;
- iii. Product price and quality and availability and quantity of products;
- iv. Transport infrastructure and logistics;
- v. Information about products and prices.

6.6.6. Challenges in food marketing, catering and retail

- i. Variability of water quality driven by mining effluents, harmful biological agents, and other suspended solids;
- ii. Post-harvest losses leading to reduced availability of food stuffs;
- iii. Inadequacy in process (value adding) infrastructure;
- iv. Poor storage facilities;
- v. High cost of rentals in improved market infrastructure;
- vi. Availability and access to reliable data and information;
- vii. Poor road infrastructure impacting production, processing, marketing, catering and retail.

6.6.7. Sources of data on food marketing, catering and retail

- i. Hotel, catering and retail businesses;
- ii. Chamber of Commerce;
- iii. ZRA;
- iv. Local authorities;
- v. Department of labour;
- vi. Financial institutions;
- vii. Ministry of Commerce, Trade and Industry;
- viii. CSO;
- ix. PACRA.

6.7. FOOD CONSUMPTION, SAFETY AND NUTRITION

6.7.1. Food consumption

Despite Zambia heavily relying on imports from the neighboring countries, there are also a number of listed companies capable of processing food products in Zambia. They process harvested or slaughtered farm produce to create marketable and edible products. Also listed are businesses that distribute food products, connecting suppliers and manufacturers to retailers and end consumers. The composition of staple food consumption in Zambia differs across food staple zones, which we define based on the share of each crop in total cultivated area (Haggblade *et.al.*, 2009).

The zones depicted in Figure 20 below show a clear spatial pattern and correlate strongly with consumption patterns. In Zambia's Copperbelt Province is depicted as being in the maize belt area (yellow patch in the North West to Central portion of the map. of northern and northwest Zambia, households consume roughly equal quantities of both cassava and maize. And in the maize belt of central, southern and eastern Zambia, maize consumption dominates staple food consumption. This however does not depict the true picture because although the Copperbelt Province is found in the area consuming 75% Maize, most of it is not grown locally in the region but comes from the periphery and tertiary areas.

Before reaching the consumer, these foods are transported, processed and distributed elsewhere in other areas other than the core region. This affects food safety, food access and food security, and the viability of local and regional food supplies on the Copperbelt and the whole country. A successful food system not only produces healthful food, but is also structured so that this food is accessible to everyone.



Figure 20. Status of staple food production zones in Zambia. (Source: Haggblade et al., 2009)

When it comes to wholesale and food distribution, Zambia's food retail sector is divided into two branches; the informal which includes stands, "Tuntembas", and hawkers, and the formal market which includes supermarkets and other large formats. The growth of the modern formal channel is relatively new with Shoprite entering the market in 1995 with the purchase of state-run stores in major cities as a part of the economic reforms. The international grocery store, Spar, also operates 7 stores in Zambia with plans to open 30 more by 2015 (Larson, 2014).

On the wholesale level, the modern formal channel began to centralize procurement with the establishment of regional distribution centres which supplied local supermarkets. Local stores no longer were responsible for their own sourcing of product. The consolidating pattern of food marketing channels follows historical precedent going back to the Middle Ages.

Braudel (1979) reported that as towns and cities arose, fragmented local markets gave way to more specialized, central markets that had assumed wholesaling functions. The transition occurred mostly in dry goods and later in fresh produce through the 19th century with further specialization in fresh produce into the 20th century with advances in technology (Codron and Lauret, 1993).

A general picture of the food wholesale and distribution in Zambia reveals important characteristics about the development of farmers, traders, processors and consumers. It has been observed that the food marketing and distribution channels may be short and momentary for subsistence farmers or long and multi-staged for commercial processors, wholesalers and exporters (Larson, 2014).

Thus, on the Copperbelt Province, food marketing channels may be readily specialized by three general stages namely; production, marketing, and consumption. Additional stages in the marketing process such as cleaning, sorting, grading, aggregating, distributing, break-bulking, and arranging, provide greater insight into where value is added along the distribution channel. In this case, the length, in terms of the number of stages, of a channel reveals how much intermediate input goes into the final product.

A sustainable food system requires robust networks of local and regional food production and distribution. Hence this chapter addresses the aspects pertaining to Food Consumption, Safety and Nutrition.

6.7.2. Food safety

Food Supply and Distribution Systems (FSDSs) are usually complex combinations of activities, functions and relations (production, handling, storage, transport, processing, packaging, wholesaling, retailing and consumption among many others) that enable cities to meet their food requirements. All these activities as is in the case of Copperbelt Province, are performed by different economic agents: food producers, assemblers, importers, transporters, wholesalers, retailers, processors, shopkeepers, street vendors, providers of services (such as credit, storage, porterage, information and extension), packaging suppliers, public institutions, (e.g. city and local governments, public food marketing boards, ministries of agriculture, ministries of transport) and private associations (e.g. traders, transporters, shopkeepers and consumers). All the above mentioned all need infrastructure, facilities, services and laws as well as formal and informal regulations to govern their decisions.

6.7.3. Nutrition

Zambia has been described as one of the 22 countries with the highest burden of under nutrition especially in children under the age of 5 according to the *Zambia Demographic Health Survey* of 2007. It has been researched and noted that under nutrition is determined by a number of factors which operate at different levels. An individual's nutritional status is influenced by three broad categories of factors; food, care, and health. Adequate nutrition requires the presence of all three.

6.7.4. Factors determining compliance and indicators of consumption and nutrition

6.7.4.1. Factors determining compliance in consumption

- i. Label reviews for foods and dietary supplements;
- ii. Food facility registration;
- iii. Health permit for food suppliers by councils;
- iv. Notifications of expiry date;
- v. Health inspection.

6.7.4.2. Indicators of consumption

i. Food purchases as indicated in 2010 living conditions survey;

- ii. Waste disposal;
- iii. Import of food as indicated by import statistics;
- iv. Number of recorded malnutrition cases per annum in the region;
- v. Number of health cases recorded related to food consumption in the region per annum;
- vi. Number of Health permits issued by local authorities to food suppliers/retail outlets per annum;
- vii. Number of cases reported of non compliance to labeling and expiry date notifications in the region per annum;
- viii. Number of Food Aid deliveries received in the region per capita;
- ix. Production losses.

6.7.4.3. Indicators of food safety

- i. Pollution levels e.g. safe water;
- ii. Level of congestion used by transport and quality of roads and distances covered;
- iii. Suitable disposal and reuse (of liquid and solid) waste produced during implementation stage;
- iv. Number of trainings and Levels of awareness of information about food safety standards;
- v. Number of technical inspections conducted;
- vi. Sewer trenching at production and processing, packaging premises;
- vii. Level of congestion and noise caused by activities;
- viii. Levels of ventilation in enclosed premises;
- ix. Maintenance of appropriate distances from nearby houses of pipes, sanitary services and waste disposal equipment;
- x. Number of inspection carried out by technicians to verify that food outlets comply with health norms and standards;
- xi. Number of beneficiaries from the food health and safety trainings at premises;
- xii. Number of cases of confiscated, expired and destroyed food stuffs due to condemnation;
- xiii. Number of cases from contamination and infection from food stuffs;
- xiv. Number of inspections and medical check-ups for street food vendors;
- xv. Number of inspections of the quality of foods sold;
- xvi. Number of times the premises or streets is swept and cleaned;
- xvii. Number of sellers who prepare foods close to sources of contamination.

6.7.4.4. Indicators of nutrition

Nutrition assessment, counseling and support

- i. Percentage of people who received nutrition assessment;
- ii. Total attendance in a month;
- iii. Of those assessed Percentage with SAM (Severe Acute Malnutrition);
- iv. Of those assessed percentage with MAM (Moderate Acute Malnutrition);
- v. Of those assessed percentage with Normal Nut. Status;
- vi. Of those assessed percentage with Overweight;
- vii. Of those assessed percentage with obesity;
- viii. Of those assessed percentage of those not categorized;
- ix. Proportion of SAM/MAM clients referred from the community to the health facility;

x. Proportion of SAM/MAM clients referred from the facility to the community/ CBO.

Growth Monitoring and Promotion

- i. Total number of <5 weighed;
- ii. Total number of Under-5 underweights out of those weighed -3 score.

Management of malnutrition

- i. Total number of activities implemented to prevent malnutrition over planned;
- ii. Total number of activities implemented to address malnutrition over planned.

Micronutrient supplementation

- i. Total number of <5 supplemented with vitamin A.
- ii. Total number of pregnant women supplemented with ferrous sulphate and folic acid.
- iii. Total number of post-partum women supplemented with vitamin A.

6.7.5. Aspects that link food consumption and nutrition to other aspects of the food value chain

6.7.5.1. Consumption

- i. Purchase of food from food markets, supermarkets, street vendors, and hawkers;
- ii. Consumption of agriculture inputs;
- iii. Increased production and diversification of products;
- iv. Food processing activities;
- v. Food transportation and related infrastructure;
- vi. Existing Legal framework on compliance to health and safety regulations;
- vii. Access to food; includes affordability and quantities as well as quality of standards.

6.7.5.2. Nutrition

The aspects linking food safety and among many others can be summarized under the following:

- i. *Warehouses for storage* to extend the availability of seasonal produce and to reduce the amount of goods that are lost to spoilage;
- ii. *Adequate transport, infrastructure and transport services* (roads, ports, railways and canals), to cut down transport times and costs and reduce damage to produce in transit;
- iii. An efficient communications system linking urban and rural areas to facilitate the exchange of market information and to improve the supply/demand ratio;
- iv. Adequate sanitation and hygiene in the various facilities;
- v. A robust Law enforcement strategy and Policy to ensure adherence to safety regulations
- vi. *Existing areas and structures* (size, location, suitability, public/private);
- vii. *Different Storage times and Methods used* required by different types of food stuffs;
- viii. Cold Storage and Preservation facilities;
- ix. Product packaging methods implored;

- x. *Levels of technology, infrastructure and services* used by small-scale and industrial food processing industries;
- xi. *Types of Operators involved including* levels of skill and experience;
- xii. Public and Private Organizations and institutions responsible for any safety interventions.

6.7.5.3. Nutrition

Marketing

- i. The psychology of how consumers think, feel, reason, and select between different alternatives (e.g., brands, products, and retailers);
- ii. The psychology of how the consumer is influenced by his or her environment (e.g., culture, family, signs, media);
- iii. The behaviour of consumers while shopping or making other marketing decisions;
- iv. Limitations in consumer knowledge or information processing abilities influence decisions and marketing outcome;
- v. How consumer motivation and decision strategies differ between products that differ in their level of importance or interest that they entail for the consumer;
- vi. The impact of consumer behaviour on society is also of relevance. For example, aggressive marketing of high fat foods, or aggressive marketing of easy credit, may have serious repercussions for the national health and economy;
- vii. Product use is often of great interest to the marketer, because this may influence how a product is best positioned or how we can encourage increased consumption. Since many environmental problems result from product disposal (e.g., motor oil being sent into sewage systems to save the recycling fee, or garbage piling up at landfills) this is also an area of interest.

Catering and retail of agricultural products

- i. In addition to being available, food needs to be of high quality, diverse, accessible, safe for consumption and affordable;
- ii. There is also a strong link between our health and well-being and food. Both malnutrition and obesity are health problems directly linked to the way we produce market and consume our food.

Agriculture production

- i. Any significant reduction in food production would affect food prices;
- ii. Adopting more sustainable farming practices can help. For example, agro-ecological methods offer a means of intensifying agriculture without synthetic chemical inputs (i.e. fertilizers and pesticides) by utilizing natural products in food production;
- iii. Precision farming techniques offer the means to reduce the use of chemical and hence some of the environmental impacts;
- iv. Regardless of the method, food production needs to remain sufficiently intensive so that productivity keeps up with food demands. In this way, land use and biodiversity will not become further compromised;
- v. Any measures aiming to improve the food system should consider utilizing agriculture for it is the main source of income.

Wholesale and distribution

- i. The selection of distribution channels will impinge upon decisions about every other element of the marketing mix. Pricing decisions will be greatly affected by whether the company attempts to mass market through as many wholesale and/or retail outlets as possible, or purposively target a relatively small number of outlets offering its customers high service levels;
- ii. The amount of promotional effort required of an organization will be a function of how much, or little, of the selling effort is undertaken by the channels of distribution it uses. The product and/or its packaging may have to be designed to suit the storage and physical handling systems of the distributor;
- iii. Wholesalers make marketing systems more efficient by buying a variety of products, in fairly large quantities, and selling these items on to other businesses who require relatively small quantities of a variety of goods.

6.7.6. Challenges in food consumption and nutrition

- i. Variability of water quality driven by mining effluents, harmful biological agents, and other suspended solids;
- ii. Climate change and variability impacts leading to low rainfall;
- iii. Post-harvest losses leading to reduced availability of food stuffs for consumption;
- iv. Inadequacy in process (value adding) infrastructure;
- v. Poor storage facilities;
- vi. Loss of indigenous knowledge and systems of food processing and storage;
- vii. Availability and access to reliable data and information;
- viii. Lack of effective food quality control systems in place;
- ix. Week outdated bye-laws for defaulters of food health and safety regulations.

6.7.7. Challenges of food safety

- i. Packaging, Storage and Processing;
- ii. Flooring;
- iii. Drainage;
- iv. Sanitary Facilities;
- v. Safe Water;
- vi. Storage infrastructure;
- vii. Transport network;
- viii. Water and Land Pollution;
- ix. Enforcement of By-Laws that do not meet the current food safety needs and challenges;
- x. Lack of proper monitoring mechanisms in place;
- xi. Lack of reliable data on food safety;
- xii. Lack of Public awareness on the importance of food safety and Hygiene.

6.7.8. Sources of data on food consumption, safety and nutrition

- i. CSO;
- ii. Wholesale, retail and markets;
- iii. Food and Nutrition Technical Assistance Project;
- iv. PACRA;
- v. Local Authorities;
- vi. District Health Management Boards (MoH);
- vii. FAO;
- viii. UNICEF;
- ix. Society for Family Health.

6.8. FOOD AND ORGANIC WASTE MANAGEMENT

6.8.1. Waste management

Waste collection has been a very big challenge in the city of Kitwe and the surrounding Copperbelt Region. Lack of proper waste management is a problem not only for residents in the City of Kitwe and Kitwe City Council but for the entire region and the nation as a whole. The ever increasing demand for refuse collection service, necessitated by the increase in population and economic activities in general, dictates an effective response to this challenge.

Waste is accumulating in the City due to lack of waste collection and transportation vehicles, which in turn is the result of insufficient funding. In addition to accumulation of waste, large amounts of waste are burned in the streets of Kitwe causing nuisances in the form of bad smell and air pollution. The waste that is collected ends up at the city dump site at Uchi.

Currently, the City of Kitwe generates approximately a total of 110,754 tonnes of waste per year from residential and public places. A total of 85,754 tonnes is generated from residential areas and comprises about 80% of all waste. It has been estimated that a total of 25,000 tonnes is generated in public places out of these quantities only 25% is adequately collected, transported and properly disposed of. The rest remains at households, open spaces, drainages, roadsides etc. This scenario makes the city unsightly and dirty and prone to out breaks of diseases.

6.8.2. Factors determining compliance and indicators of food and organic waste management

6.8.2.1. Factors determining compliance

- i. Though the management of solid waste depends on resources, human, financial, time and material, economic resources alone cannot solve the problem;
- ii. Some of the causes of the problem of solid waste management emanates from cultural, social and political reasons;
- iii. Financial and technical nature;
- iv. Public education and awareness-raising programme on solid waste management;
v. Poor road and communication infrastructure.

6.8.2.2. Indicators of waste disposal and management

- i. Number of waste disposal sites;
- ii. Development and enforcement of municipal by laws ;
- iii. Amount of waste disposed of at waste disposal sites ;
- iv. Service coverage of waste collection, resource recovery and recycling and treatment facilities;
- v. Number of players in solid waste management;
- vi. Increase awareness and participation;
- vii. Number of treatment and disposal facilities such as incinerators ;
- viii. Compliance with relevant legislation and regulations.

6.8.3. Aspects that link food and organic waste management to other aspects of the food value chain

A sustainable food system is a collaborative network that integrates sustainable food production, processing, distribution, consumption and waste management in order to enhance the environmental, economic and social health of a particular place. Food waste or food loss is food that is discarded or lost or uneaten. The causes of food waste or loss are numerous, and occur at the stages of production, processing, retailing and consumption. Losses and waste along the food supply chain often result from interrelated causes. Some actions at one stage in the chain can affect the whole chain, some can be traced back to harvest or even pre-harvest. It therefore becomes imperative to look at the food supply chain as a system of interrelated steps, with critical control points, considering any action on a particular stage not in isolation but as part of the whole food chain.

At the stage of production, The choice of the right variety, adapted to a given location (production site) and meeting the requirements of the target market in terms of quality specifications and time to maturity is an important consideration at the production stage (Kader, 2002). At the retail stage, retail stores throw away large quantities of food. In most cases, this consists of items that have reached either their best before, sell-by or use-by dates. Food that passed the best before, and sell-by date, and even some food that passed the use-by date is still edible at the time of disposal, but stores have widely varying policies to handle the excess food.

Further, at the retail and governance stage, food is wasted as a result of poor storage facilities, poor planning of purchases often leading to buying more than is needed, discarding food due to confusion over "best-before" and "use-by" dates, excess portions prepared and not eaten and poor food preparation techniques often leading to less food being eaten or food quality losses and waste (Baptista *et al.*, 2012).

6.8.4. Challenges in food and organic waste management

- i. High post-harvest looses
- ii. Poor waste storage infrastructure
- iii. Availability and access to reliable data and information.

6.8.5. Sources of data on food and organic waste management

- i. Reports of waste disposal;
- ii. National and local waste management strategies;
- iii. Waste and sanitation policies;
- iv. CopWaste Company;
- v. Zambia Environmental Management Agency.

6.9. HEALTH, HEALTH FACILITIES, WATER AND SANITATION

6.9.1. Health and health facilities

KCC offers preventive health services through its public health unit that is in charge of monitoring of residential, industrial and commercial premises, management of waste and malaria control (UN Habitat, 2009). These management responsibilities are stipulated in the public health legislation. Malaria was estimated to account for close to 10% of fatalities in the district given low lying residential areas of Chipata, Ipusukilo, Kapoto, Kakolo, Luangwa and Zamtan. These are low cost and high density areas that are characterised by poor planning due to their informal origin.

In terms of child health, 48% of children aged 0-5 years showed stunting, 7% showed wasting and 14.3 (Mwitwa and Ng'andwe, 2010). These health conditions in children have been related to inability of households to afford adequate and nutritious food. Waste collection has been subcontracted.

In terms of health service delivery, Kitwe has some of the major hospitals in Zambia. Three major hospitals, Kitwe Central Hospital, Sinozam Hospital and Wusakile Hospital are only found in Kitwe with Kitwe Central Hospital belonging to government. The other two are quasi-private. A number of filter clinics as well as clinics dedicated to maternity cases are scattered all over the district but primarily concentrated in the urban areas. Kitwe has seen a number of private medical hospitals and clinics commence business within the city. The city has no hospital dedicated to children health problems.

Kitwe Central Hospital, Wusakile Hospital and SinoZam Friendship Hospital are the three main hospitals in the city. However, there are government health facilities (Clinics) in some of the residential areas particularly the medium and low cost areas. These are additionally supplemented by maternity clinics.

The main hospitals are able to undertake specialised surgeries failure to which cases are referred to the University Teaching Hospital in Lusaka. Government facilities are supplemented by privately owned clinics and hospitals.

6.9.2. Water and Sanitation

Zambia is listed as one of Sub-Saharan countries with the lowest water supply and sanitation coverage in the world with only 14.9% and 39.2% people have access to proper sanitation facilities and access to safe water supply respectively (GRZ, 2002). Partly due to the growing demand brought about by unplanned settlements and population growth, the city has experienced an increased demand for water and sanitation services. These pressures coupled with rapid urbanization have impacted on the delivery of municipal sanitation services such as:

- i. *Water supply and infrastructure*: construction, operation and maintenance of public water systems; and water acquisition, production and distribution of water to the various demands of the city;
- ii. *Municipal sanitation service*: wastewater sewage and treatment services that include the collection of liquid waste from residential, commercial, and industrial facilities to a sewage system to a treatment plant;
- iii. *Municipal solid waste management*: collection, removal and disposal of garbage, refuse, hazardous and other solid wastes.

The city contributes to the provision of some of these services as they have been outsourced. Water supply is better organised in the formally planned residential areas (in-house connections) such as the low density suburbs compared to some of the areas that have communal taps such as high density areas. Other means of water delivery include yard taps and water kiosks. The provision of services is guided by the National Water Supply and Sanitation Council (NWASCO).

As an example for Kitwe, which is similar to other municipal jurisdictions in the food region the local water utility, Nkana Water and Sewerage Company (NWSC), is mandated to provide water supply and sanitation services within the city of Kitwe. Kitwe City Council holds 70% shareholding in NWSC and the remaining 30% is owned by Kalulushi Municipal Council. NWSC faces challenges such as the old and dilapidated water distribution network and also a rapid population growth. Vandalism of its water distribution infrastructure also affects the quality of services provided to the City. The mandate of NWSC is broken down as follows:

- i. Water Supply and Infrastructure: Construction, operation and maintenance of public water systems; and water acquisition, production and distribution of treated water to various demands of the City;
- ii. Municipal Sanitation Service: Wastewater collection and treatment service that includes the collection of liquid waste from residential, commercial and industrial facilities through a sewage network to various treatment facilities within the City before being discharged to the natural environment.

The management of the solid waste collection function is the responsibility of the City Council who organizes the collection of waste from public areas. There are other private solid waste collection providers who collect waste from private households and commercial premises at a fee.

7.1. CONCLUSION

The Kitwe city region food system is made up by the core region which is the area within the Kitwe district boundaries, the peripheral or secondary region made up by districts that border Kitwe and which produces and supplies agricultural and food products to Kitwe. The outer region beyond the Copperbelt Province and the rest of Zambia is termed the 'other region" which supplies various agricultural products and foods to the core and peripheral regions and is in turn supplied with agricultural products and foods from either the core or peripheral region.

The agricultural and food value chain is composed of farmer input supply, production, post-harvest handling, traders, food manufacturing companies, retailers and consumers. The value chain is defined by vertical and horizontal linkages with a range of players from civil society, farmer organisations, corporate entities, associations of traders and retailers, consumers and consumer organisations, financial institutions, research and training institutions, international organisations and government. Each node of the value chain is an agricultural area that has specific characteristics that link it to the other nodes with its challenges that may be unique or shared with other agricultural areas.

The analysis found a range of national and local policies and legislations that are used to manage the value chain. Some of the legislation are fairly recent whilst others are much older and require reforms. Systems for product storage are poorly developed and primarily due to lack of investments in storage facilities for agricultural products. This has significant effects on food quality and safety. Levels of profits for producers and traders are also affected by the lack of storage facilities which in some cases results high food wastage particularly for perishables such as fruits, tomatoes and vegetables.

Not all players in the value chain have formal groupings through which knowledge and technologies are shared. Additionally, significant challenges in access to information about each of the nodes in the value chain and also how this information is reported and disseminated. Levels of production, consumption, processing and distribution are poorly understood.

Several sector specific policies and legislations exist in Zambia which impacts how agriculture is governed in the CRFS. The policies and legislation include those that govern land, fisheries, forestry, water and the air. Governance of land under customary tenure does not guarantee exclusive rights over the land. A large number of small scale producers "own" land under this category that they use to produce and supply agricultural products to the CRFS. The key challenge with customary land tenure is security of tenure where rights of land holders are not recognised and protected by the state. Conflicts in the management of land have included conflicts between customary and private rights holders, conflicts in land allocation, and land boundary conflicts.

Cities within the CRFS have generally outdated by-laws that have not been revised since then to match with social dynamics related to enhancing the food security of cities. Additionally, there are no city specific policies on urban agriculture despite the same being highlighted in the Urban and Regional Planning Act of 2015. Ndola is an exception to a certain as it has an Urban Agriculture Strategy and Policy developed under the support of RUAFF. Sector specificity of policies and legislation has generally affected the structure and function of institutions and how management systems are structured and monitored.

Despite the lack of integrated sector governance infrastructure, the R-SNDP identifies challenges specific to the agriculture sector that have been targeted in order to transform the sector:

- 1. Unbalanced agriculture policies which have favoured maize production and disadvantaged the production of other crops;
- 2. Inadequate utilisation of research and development, farm mechanisation, science and technology and ICT to increase yields and maximise the comparative advantage of different areas of the country and access production and market information;
- 3. Poor storage, inadequate irrigation and other infrastructure challenges have resulted in postharvest wastages and over-reliance on rain-fed agriculture.

The recognition of these challenges in the R-SNDP, has somehow been in vain as they are, in temporal terms, anchored outside the policy framework given that the R-SNDP was prepared after the National Agriculture Policy was prepared and covers the period 2004-2015 while the R-SNDP covered the period 2013-2016. This disconnect in terms of policy frameworks has somehow impacted agriculture and related sectors negatively.

7.2. RECOMMENDATIONS

Even though information collection, accessibility and sharing are primary challenges in the Kitwe city region food system, each of the areas of the agricultural system has specific challenges that need prioritisation and interventions. Knowledge sharing amongst players as well as stronger and functional networking are critical to strengthening the agricultural and food value chain so that it assures sustainable food security.

A key element in the situation analysis is the unclear systems designed to assure resilience of the food system to climate change and variability. Even though national policies and strategies for climate change adaptation and mitigation are well enumerated, robust systems that are tailored to the unique city region food system characteristics are not apparent. The development of systems that ensure the resilience of the system to the effects of climate change and variability has the potential to improve livelihoods, particularly of peri-urban and rural farmers.

Local policies and legislations require updating, in some cases require formulation as they are not present, so that they are in conformity with national policies and legislations.

7.3. WAY FORWARD

A multistakeholder consultation was held to validate and review the collected data and information, and to identify key priority areas and related critical issues that need further assessment, based on the rapid CRFS characterization and local authorities' priorities.

In the next phase, quantitative and qualitative data will be collected to in-depth assess the 3 following areas :

1. Agricultural production

The stakeholders' consultation seemed necessary to look at the land where production takes place in order to understand the availability of land for production in the city region, what are access and tenure rights, to assess completion between urban development and agriculture and over all to address production productivity issues.

2. Food supply and distribution system

This area of work aims to shed light on where the food in Kitwe CRFS comes from. In this light, food flows for main food commodities such as fruits & vegetables, livestock (beef, fish, poultry, pork), eggs and dairy products will be analyze and map. Furthermore, components of the food chain will be examined to assess the suitability of physical infrastructure (for example processing and storage facilities for foodstuffs, road infrastructure, etc). particular attention will be given to market infrastructure and governance, including the roles of actors involved in various stages of the food value chain and the estimation of food waste and losses.

3. Environment and natural resources degradation

This key area of work aims at looking at the implications of unsustainable practices and other activities (e.g. mining) on main natural resources, soil, water and forests, and on food production and understand what is the existing state of the environment and natural resources with respect to agriculture. The existing legislative framework will be examined to understand if and how it supports agricultural practices and lastly, to comprehend what is the effect of population growth on food production and the environment.

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APPENDICES

4.00	Total Pop.		Total Usually Working Pop.			Accommodation & Food Services					Information & Communication						
Group							Male		Female			Male			Female		
Group	Rural	Urban	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
12-14	1,137	38,126	80	210	290	-	-	-	-	1	1	-	-	-	-	1	1
15-19	1,633	62,280	325	2,176	2,501	1	23	24	-	31	31	-	6	6	1	6	7
20-24	1,159	49,579	629	11,422	12,051	1	153	154	2	205	207	-	72	72	-	69	69
25-29	1,106	46,751	786	22,154	22,940	-	236	236	1	361	362	-	147	147	-	106	106
30-34	960	37,508	772	22,949	23,721	-	204	204	2	258	260	-	136	136	-	78	78
35-39	769	28,739	631	18,937	19,568	1	171	172	1	208	209	2	120	122	-	44	44
40-44	642	19,579	521	13,291	13,812	-	115	115	1	127	128	1	89	90	-	33	33
45-49	482	14,826	418	9,662	10,080	-	68	68	-	81	81	-	51	51	1	20	21
50-54	450	11,512	394	7,198	7,592	-	54	54	-	48	48	-	55	55	-	17	17
55-59	366	7,866	306	4,400	4,706	1	28	29	-	19	19	-	23	23	-	4	4
60-64	347	5,751	294	2,613	2,907	-	19	19	-	9	9	-	8	8	-	4	4
65-69	244	3,572	210	1,430	1,640	-	10	10	-	9	9	-	2	2	-	-	-
70-74	207	2,357	164	719	883	-	6	6	1	-	1	-	-	-	-	3	3
75+	277	2,919	190	563	753	-	8	8	-	2	2	-	1	1	-	-	-
TOTAL	9,779	331,365	5,720	117,724	123,444	4	1,095	1,099	8	1,359	1,367	3	710	713	2	385	387

Appendix I: Accommodation, food services, information and technology in the core region based on age groups

Pagion	Total	Usually Workir	ng Pop.	Accomm	odation & Foo	d Services	Information & Communication			
Region	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total	
Chililabombwe	3,855	17,460	21,315	30	222	252	11	60	71	
Chingola	10,841	41,584	52,425	30	661	691	28	227	255	
Kalulushi	8,955	18,124	27,079	13	159	172	26	106	132	
Kitwe	5,720	117,724	123,444	12	2,454	2,466	5	1,095	1,100	
Luanshya	7,385	25,441	32,826	41	378	419	11	146	157	
Lufwanyama	27,387	788	28,175	64	1	65	118	1	119	
Masaiti	32,870	695	33,565	54	6	60	107	5	112	
Mpongwe	37,414	7,055	44,469	27	56	83	17	18	35	
Mufulira	3,741	33,037	36,778	3	396	399	7	175	182	
Ndola	-	107,992	107,992	-	2,684	2,684	-	1,134	1,134	
Copperbelt	142,284	369,900	508,068	274	7,017	7,291	330	2,967	3,297	

Appendix II: Accommodation, food services, information and technology in the core and peripheral region

Appendix III: Finance and insurance; community, social and personal services in the core region food system

٨٩٥	Total Pop		Total Usually Working Pop			Finance & Insurance						Community, Social & Personal Services					
Group	TULA	rotarrop.		rotar ostany working rop.			Male		Female			Male			Female		
Group	Rural	Urban	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
12-14	1,137	38,126	80	210	290	-	2	2	-	-	-	-	3	3	1	12	13
15-19	1,633	62,280	325	2,176	2,501	-	1	1	-	3	3	6	201	207	1	211	212
20-24	1,159	49,579	629	11,422	12,051	1	38	39	-	74	74	13	1,157	1,170	23	1,240	1,263
25-29	1,106	46,751	786	22,154	22,940	1	199	200	-	196	196	38	2,375	2,413	37	2,733	2,770
30-34	960	37,508	772	22,949	23,721	-	198	198	-	122	122	51	2,659	2,710	33	2,590	2,623
35-39	769	28,739	631	18,937	19,568	-	151	151	-	89	89	53	2,445	2,498	16	2,025	2,041
40-44	642	19,579	521	13,291	13,812	-	107	107	1	52	53	38	1,868	1,906	20	1,284	1,304
45-49	482	14,826	418	9,662	10,080	-	72	72	1	28	29	20	1,418	1,438	7	973	980
50-54	450	11,512	394	7,198	7,592	1	38	39	-	10	10	17	1,146	1,163	12	706	718
55-59	366	7,866	306	4,400	4,706	-	35	35	-	9	9	16	672	688	1	297	298
60-64	347	5,751	294	2,613	2,907	-	19	19	-	1	1	1	439	440	4	111	115
65-69	244	3,572	210	1,430	1,640	-	5	5	-	1	1	3	263	266	-	41	41
70-74	207	2,357	164	719	883	-	1	1	-	-	-	2	134	136	-	14	14
75+	277	2,919	190	563	753	-	2	2	-	-	-	-	90	90	-	8	8
TOTAL	9,779	331,365	5,720	117,724	123,444	3	868	871	2	585	587	258	14,870	15,128	155	12,245	12,400

Pagion	Total Usually W	orking Pop.		Finance & Insur	rance		Community, Social & Personal Services			
Region	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total	
Chililabombwe	3,855	17,460	21,315	3	85	88	187	2,755	2,942	
Chingola	10,841	41,584	52,425	6	295	301	477	7,905	8,382	
Kalulushi	8,955	18,124	27,079	1	71	72	370	3,353	3,723	
Kitwe	5,720	117,724	123,444	5	1,453	1,458	413	27,115	27,528	
Luanshya	7,385	25,441	32,826	3	185	188	286	6,055	6,341	
Lufwanyama	27,387	788	28,175	3	-	-	774	51	825	
Masaiti	32,870	695	33,565	2	-	-	959	185	1,144	
Mpongwe	37,414	7,055	44,469	9	19	28	942	491	1,433	
Mufulira	3,741	33,037	36,778	1	162	163	143	6,943	7,086	
Ndola	-	107,992	107,992	-	1,310	1,310	-	25,941	25,941	
Copperbelt	142,284	369,900	508,068	33	3,580	3,613	4,551	80,794	85,345	

Age	Total Pop.		Total Usually Working Pop.			Water Only)	Supply	(Urban	Real Estate activities (Urban Only)		
Group	Rural	Urban	Rural	Urban	Total	Male	Female	Total	Male	Female	Total
12-14	1,137	38,126	80	210	290	-	-	-	-	-	-
15-19	1,633	62,280	325	2,176	2,501	5	2	7	-	-	-
20-24	1,159	49,579	629	11,422	12,051	38	9	47	1	-	1
25-29	1,106	46,751	786	22,154	22,940	72	25	97	1	10	11
30-34	960	37,508	772	22,949	23,721	84	32	116	10	5	15
35-39	769	28,739	631	18,937	19,568	86	18	104	6	7	13
40-44	642	19,579	521	13,291	13,812	74	15	89	3	2	5
45-49	482	14,826	418	9,662	10,080	47	8	55	4	6	10
50-54	450	11,512	394	7,198	7,592	45	8	53	4	5	9
55-59	366	7,866	306	4,400	4,706	22	2	24	6	6	12
60-64	347	5,751	294	2,613	2,907	7	2	9	4	-	4
65-69	244	3,572	210	1,430	1,640	1	2	3	1	-	1
70-74	207	2,357	164	719	883	-	-	-	-	1	1
75+	277	2,919	190	563	753	-	-	-	1	-	1
TOTAL	9,779	331,365	5,720	117,724	123,444	481	123	604	41	42	83

Appendix IV: Water supply in urban areas and real estate activities in the core region food system

Appendix V: Water supply in urban areas and real estate activities in the core and peripheral region food system

Region	Total Usua	ally Working	g Pop.	Water Si	upply (Urba	an Only)	Real Estate activities (Urban Only)			
	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total	
Chililabombwe	3,855	17,460	21,315	4	111	115	-	2	2	
Chingola	10,841	41,584	52,425	16	230	246	2	16	18	
Kalulushi	8,955	18,124	27,079	3	112	115	-	3	3	
Kitwe	5,720	117,724	123,444	-	604	604	-	83	83	
Luanshya	7,385	25,441	32,826	1	210	211	-	15	15	
Lufwanyama	27,387	788	28,175	3	-	3	-	-	-	
Masaiti	32,870	695	33,565	15	3	18	-	-	-	
Mpongwe	37,414	7,055	44,469	6	7	13	1	-	1	
Mufulira	3,741	33,037	36,778	-	191	191	1	8	9	
Ndola	-	107,992	107,992	-	641	641	-	120	120	
Copperbelt	142,284	369,900	508,068	48	2,109	2,157	4	247	251	