Food and Agriculture Organization of the United Nations

RUAF Foundation

ASSESSING AND PLANNING CITY REGION FOOD SYSTEM

KITWE (Zambia) Synthesis Report

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Rome, 2018

Required citation:

FAO. 2018. Assessing and Planning City Region Food System Kitwe (Zambia) Sythesis Report. Rome, Licence: CC BY-NC-SA 3.0 IGO.

ISBN 978-92-5-130865-3

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Foreword

Cities and their surrounding areas, known as 'city regions', are increasingly concerned about food security and how it is affected by urban growth, escalating urban poverty, food price hikes, climate change, changing consumption patterns and the rise in diet-related health problems. Of particular concern is urban growth, which creates increased demand for the same land and water that also provide vital food and ecosystem services. This challenge calls for integrated territorial development and balanced urban–rural linkages for the benefit of urban and rural population alike.

The city region food system (CRFS) perspective provides a platform on which to build concrete policy and offer investment opportunities to address these developmental issues with the objective to achieve better economic, social and environmental conditions in both urban and surrounding rural areas. Strategies and tools include: the promotion of peri-urban agriculture; the preservation of agricultural land areas and watersheds through land use planning and zoning; the development of food distribution systems and social protection programmes; support for short supply chains and the local procurement of food; and the promotion of food waste prevention, reduction and management.

Building a sustainable and resilient CRFS, however, requires political will – integrating available policy and planning instruments (e.g. infrastructure, logistics, public procurement, land use planning), involvement of various government departments and jurisdictions (local and provincial), and inclusive organisational structures at different scales (municipal, district, etc.). An effective CRFS offers a lens through which this integration and coherence can be addressed at a specific territorial level. CRFS can also operationalise linkages between Sustainable Development Goals: SDG 2 (food security, nutrition and sustainable agriculture); SDG 11 (inclusive, safe, resilient and sustainable cities); and SDG 12 (sustainable production and consumption).

CRFS implementation is in line with the recently adopted New Urban Agenda (October 2016)[1] that emphasises the need for cities to "strengthen food system planning" and recognises the vulnerability of long-distance food supply systems. The Milan Urban Food Policy Pact – the first international protocol, currently signed by more than 160 cities, including the cities in this series of reports – also calls for the development of more sustainable and resilient urban food systems. Signatory mayors from cities around the world pledged to develop actions and strategies to improve their urban food systems with strong urban–rural linkages.

FAO and RUAF Foundation partnered to support local institutions in understanding and operationalising a CRFS in seven cities selected from across the globe to represent their regions – Lusaka and Kitwe (Zambia), Colombo (Sri Lanka), Medellín (Colombia), Quito (Ecuador), Toronto (Canada) and Utrecht (The Netherlands). All results presented here describe the experiences from each city in terms of planning and informed decision-making, prioritising investments and design of sustainable food policies and strategies to improve the resilience and sustainability of the entire food system. Combined, this CRFS knowledge culminates in a set of tools to support individual city regions around the world to assess and better plan their own food system.

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Director RUAF Foundation

1 http://habitat3.org/the-new-urban-agenda/

Preface

FAO (Food for the Cities Programme) and RUAF Foundation (CityFoodTools Project) joint programme on assessing and planning city region food systems (CRFS) aims at building more resilient and sustainable food systems within city regions by strengthening rural–urban linkages.

In Zambia the programme was implemented in Lusaka and Kitwe and in partnership with University of Zambia (UNZA), in Lusaka, and with the Copperbelt University (CBU) in Kitwe; the activities were implemented in close consultation with the respective City Councils, the Ministry of Local Government and the Ministry of Agriculture that provided guidance and facilitated stakeholder engagement and participation.

The CRFS assessment and planning process helped to identify gaps to be bridged and bottlenecks to be opened to create more resilient and inclusive food systems within specific city regions.

In both the city regions, special attention was given to the challenges of: i) how to improve access to adequate food for the vulnerable and poor urban population; and ii) how to improve market access for the smallholder farmers in urban, peri-urban and rural areas in the city regions selected. The methodology was highly participatory and adopted an integrated, holistic, food value chain approach in a spatial, rural–urban continuum perspective involving different sectors and various levels of a city region food system, such as sustainability and resilience.

With the longer-term aim of making the CRFS more sustainable and resilient, and improving the livelihoods of rural and urban dwellers in the city region, the assessment examined current and future constraints affecting the local and regional food value chain. It used local knowledge to help explore these constraints in relation to specific sites and to test and adjust new ideas to improve sustainability. In particular, as maize occupies a central position in Zambia's agricultural political economy, the CRFS process highlighted the importance of crop diversification and in particular the role of horticulture production and the value chain in feeding the urban population and contributing to healthy nutrition.

As a result of project activities implemented in the last three years, there has been renewed interest and policy discussions at institutional levels. In particular, this process has built bridges of communication among institutions to introduce a more integrated and territorial perspective in planning sustainable food systems.

In the framework of the decentralization process in Zambia, the CRFS assessment and planning process, together with its findings and recommendation, will act as the base to contribute to the ongoing formulation of the National Urbanization Policy. This aims to provide an overarching coordinating framework to address urban challenges and to maximize the benefits of urbanization, while mitigating potential adverse externalities. The CRFS assessment and planning process will be essential to provide key inputs to ensure that food security and nutrition as well as food system dimensions are part of the policy.

Finally, this work has substantially contributed to FAO's Country Programming Framework (CPF) 2017–2021 priorities: 1) Improve production and productivity of crops, livestock, fisheries and forestry; 2) Sustainable management of the natural resource base and Increasing Resilience and Uptake of Climate-Smart Agriculture.

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Acknowledgements

This present report was developed within the framework of the Food for the Cities Programme, in partnership with RUAF Foundation, CityFoodTools Project.

The report was jointly developed by FAO, the Copperbelt University and the Kitwe City Council. Specifically it was prepared by Jacob Mwitwa (Copperbelt University), Mainza Sibajene and Kasasa Katebe (Kitwe City Council), Gilbert Chivanga Chipoya (District Agricultural Office, Ministry of Agriculture), Yaki Namiluko (Copperbelt University) with the guidance, inputs and review provided by Guido Santini, Louison Lançon, Makiko Taguchi, Michela Carucci and Martin Hilmi from the FAO Agriculture Plant Production and Protection Division (AGP). In addition, it also benefited significantly from the technical review provided by Joy Carey from RUAF Foundation.

The authors also acknowledge the project partner RUAF Foundation for the overall technical support and all the organisations that constituted the membership of the Multistakeholder Task Team that resulted in the preparation and completion of this report: Forestry Department; National Aquaculture Research and Development Centre; National Traders and Marketeers Association of Zambia; Central Statistical Office; World Vision Zambia; all the Councils/Municipalities of the Copperbelt Province; Sustainable Agriculture Programme; Zambia Environmental Management Agency; Kitwe District Health Board; Nkana Water and Sewerage Company; Department Community Development; District Education Office; Amiran Zambia; Zambia National Farmers Union; Kitwe District Land Alliance; all District Agricultural Coordinators of the Copperbelt Province.

The report was edited by Philip Morgan. Layout design and production were provided by Gabriele Zanolli.

The authors would like to thank the German Federal Ministry of Food and Agriculture and the Carrasso Foundation for providing financial support for the implementation of the overall programme and for supporting the implementation of the city region food system assessment in Kitwe.

All maps and figures presented in this report, unless the source is acknowledged, have been generated by the authors or resource persons contracted to do so.

Executive summary

Why undertake a Kitwe city region food system assessment?

FAO entered into an agreement with the Copperbelt University (CBU) for the implementation of an assessment methodology for Kitwe and its city region food system (CRFS). This entailed the coordination and implementation of country level activities in Kitwe as one of the pilot cities in Zambia – the other being Lusaka. The project examined current and future constraints affecting productivity, production and access to markets of local and regional food value chains, and the implication of farming practices on natural resources and the environment with the purpose of understanding better how to make the CRFS more sustainable and resilient, and improve the livelihoods of rural and urban dwellers now and in the future. In order to promote local ownership, the process was highly participatory. Specifically, it aimed to foster inclusive multi-stakeholder dialogue processes in order to support local governments and other multiple stakeholders in taking informed decisions on food planning and to enhance synergies, reduce costs and prioritise investments.

Methodology

The methodology recognised the great importance and added value of consultative and participatory processes, balanced with information sharing, data collection and the use of more quantitative assessment tools. The stakeholder dialogue process that was established as core to this assessment has helped to ensure collective buy-in and ownership, which should stand future work in good stead.

A preliminary mapping of Kitwe CRFS stakeholders led to the constitution of the Multi-Stakeholder Task Team (MTT). This group then met at regular intervals to oversee and assist with the assessment process. The first stage situation analysis was prepared through the collection, review and analysis of existing information drawn from many different sources.

The CRFS assessment was grouped into three case studies based on food areas:

1. Agriculture Production (Land Availability, Access and Tenure, Competition Between Urban Development and Agriculture, Production and Productivity Issues);
2. Food Processing, Supply and Distribution System (including food consumption and nutrition at city region level);
3. Status of Environment and Natural Resources Degradation.

A number of key perishable and frequently traded agro-commodities were selected for an in-depth value chain study:

1. *Vegetables*: cabbage, Chinese cabbage, onion, tomato, egg plant (local), amaranth, pumpkin leaves, rape;
2. *Fruits*: bananas and mangoes;
3. *Livestock*: beef, chicken and fish. This includes products of beef (cattle, sausage, whole meat, minced meat), fish (including fingerlings) and chickens (chicks, broilers, layers);
4. *Dairy products:* milk and eggs.

Four working groups made up of the most relevant stakeholders were constituted around key themes to identify areas of intervention: production, value chains, agro-processing and consumption, environment and natural resource management.

Data for the assessment was collected from primary and secondary sources. These included questionnaires, interviews, focus group discussions, geo-referencing and mapping.

Definition of the Kitwe city region

The boundaries of the Kitwe CRFS have been defined based on food flows and governance criteria with the following specific distinctions:

1. *Primary or core region*: region within legally recognized administrative boundaries for Kitwe district;
2. *Secondary or 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;
3. *Tertiary or other region:* region outside the *secondary region* but from which the Kitwe food system obtains agricultural, livestock and poultry products.

Governance of the city region food system

The agriculture sector is primarily governed by policies and legislation developed and implemented through the Ministry of Agriculture. The principal governing policy is the National Agriculture Policy (2012–2020), which has the primary aim of ensuring that agriculture contributes to reducing poverty and increasing incomes at household level. Other sectors, such as environment, fisheries, forestry, land, mining and water, also have legislation that affect the way agriculture is governed. Zambia has no land policy even though land is governed by the Lands Act of 1995. Land access and tenure is difficult in the core region, especially for smaller-scale producers, due to competition between agriculture and other land uses, such as mining and urban development. There are lots of different sector policies with nothing to bring them all together. However, a new draft land policy is now underway. This, along with devolution of tenure decision-making to the local council level, should make a significant difference in terms of guiding access to and ownership of land, as well reviewing the Land Act of 1995. Several institutions and service organisations have a presence in the city region. These include government departments and statutory bodies, civil society organisations, community and faith-based organisations, local communities, the private sector, and academic and research institutions.

Production and sources of food consumed in the city region

The core and peripheral regions receive a good annual average rainfall of over 1 200 millimetres and have an estimated 80 000 farmer households. While the Kitwe city region has great potential to produce a wide range of food products, this has not been fully tapped. The major crops cultivated are maize, sweet potatoes, cassava, groundnuts and vegetables. Most farmers involved in the production of vegetables tend to specialise in just one or two at a time. Oil seed rape production is mostly left to small-scale producers. Cabbage, tomato and onion are favoured by large-scale producers. Maize, however, is the main cash crop. The main livestock reared are chickens, cattle, goats and sheep. Supply of fresh foods in the region comes from a wide array of sources, ranging from backyard gardens and small-scale farmers and traders to commercial farmers and traders outside the country (Tanzania and South Africa). Tomatoes and onions partly originate from outside the core and peripheral regions. Bananas and mangoes are also partly

imported. Imported fruits, vegetables, dairy and meat products do, however, constitute less than half of the foods consumed within the city region. The core and peripheral regions import food from the tertiary region to meet the shortfall from internally produced food, particularly for beef, tomatoes and chickens. Food from the core region, including cereals, such as maize, and vegetables, livestock and dairy products, are exported to the peripheral region and DR Congo. The city region struggles with reliable estimates of vegetable production figures because national agriculture production estimates focuses on cereals, livestock and dairy products.

Agro-processing and distribution

Processing facilities exist primarily for meat (whole meat, mince and sausage), maize (maize meal) and milk (packing and cheese production). Fruit and vegetable processing occur at a limited level within the core and peripheral regions but are abundant in the tertiary region. This limited capacity for food processing and storage in the core and peripheral regions especially affects fruit and vegetables, with very high losses that could be avoided with appropriate interventions. Fruit products such as juices and jams are largely imported as are processed vegetables. Overall, wholesale and distribution is complex, poorly developed with no strategic overview of any sort and a mix of informal and formal systems. Full participation and market access for producers is therefore restricted. The distribution network of agro-commodities is populated by various actors: producers, processors, middlemen, traders and retailers. Each commodity has a different network. The milk distribution chain is the most complex distribution channel.

Key challenges in the CRFS

Production, processing, distribution and retail all face challenges. More food could be produced in the CRFS if these challenges are addressed. This report sets out a range of suggested measures that also link to national and local government policy development. The major constraints that farmers face include poor road infrastructure and market access, high input costs, lack of credit facilities, poor storage facilities as well as the prevalence of pests and diseases. Food flow analysis of specific products and their market channels highlighted the risks, uncertainties and losses resulting from price fluctuations borne by the farmer. Also, many small-scale producers in the region experience low productivity due to a lack of proper storage facilities within the value chain. Overall, there is a need for technical investment and services, and a knowledge-sharing platform, particularly for small-scale producers to increase self-sufficiency. The high cost of production and the dependence on imports to the region (especially from South Africa) has made it even more difficult for the local food-processing industries to thrive.

The levels of environmental and natural resource degradation are high, due to a combination of urbanisation, poor agricultural practices and industrialisation. More and clearer policy – as well as enforcement – is required. Enforcement also requires increased capacity. None of the jurisdictions in the CRFS for food and organic waste management fully complies with any of the recommendations of UNECA (UN Economic Commission for Africa). Figures for volumes of losses and waste generated for the agro-commodities in question were unavailable, as traders and local authorities do not maintain good records of quantities.

The core region has a serious problem with stunting caused by malnutrition. The 2013–2014 Zambia Demographic and Health Survey (ZDHS) found that 36 percent of children under five were stunted. For that reason alone work to improve the CFRS resilience and sustainability is absolutely crucial for long-term health improvement. In general terms, the assessment revealed that food insecurity and malnutrition in the Kitwe city region is to a large extent due to both economic access to food (poverty, unemployment), but also to a limited awareness of and knowledge about healthy and sustainable nutrition and diets.

Recommended policy and planning interventions for the Kitwe CRFS

In order to begin to address some of the above challenges, the following policy recommendations and interventions were identified by the four working groups:

FOOD AREA	CHALLENGES	POTENTIAL INTERVENTION
Agriculture production	Inadequate investment in technical services	Increase financing to agriculture technical services; private sector participation.
	Inadequate agricultural infrastructure and mechanisation	Improve access roads and food storage facilities.
	Dis-harmonisation of stakeholder approaches to land tenure	Implement the decentralisation policy devolving more land responsibilities to local government; create digital maps to enhance accessibility; awareness.
	Use of unsafe water in agriculture and agro-commodities	Establish community-based knowledge-sharing platforms; improve capacity to ensure compliance.
Agro-processing, distribution and marketing	Inadequate processing of agro-commodities	Capacity building in affordable technology and processing methods for vegetables and fruits; establish knowledge-sharing platforms.
Value chain	Packaging, grading, labelling, commodity sorting and promoting linkages among value chain actors	Catalyse policy reforms and establish an institutional framework; establish knowledge-sharing platforms.
	Lack of credit facilities for small-scale producers	Provide mechanisms for farmer access to non-collateral farm loans/Insured Credits; promote contract farming, Pass-on-the-Gift and low-input farming; establish a farmers' credit provider supported by government.
Environment and natural resources degradation	Management of agrochemicals	Establish knowledge-sharing platforms; increase civil society awareness of farming issues; improve capacity to enforce environmental regulations.

1. About the Project

1.1 Background

FAO (Food for the Cities Programme) and RUAF Foundation (City Food Project) joint programme on assessing and planning city region food systems (CRFS) aims at building more resilient and sustainable food systems within city regions by strengthening rural–urban linkages. The joint programme has been implemented in eight pilot cities across the world (Colombo, Dakar, Lusaka, Kitwe, Medellin, Quito, Toronto and Utrecht). The programme provides assistance to local governments and producer organisations in identifying and understanding gaps, bottlenecks and opportunities for sustainable planning of food policies and strategies to improve food systems with strong rural–urban linkages.

In Kitwe, the Food and Agriculture Organization of the United Nations (FAO) entered into an agreement with the Copperbelt University (CBU), so that CBU implements a methodology for the assessment of the Kitwe City Region Food System (CRFS). This entailed the coordination and implementation of country-level activities in Kitwe as one of the pilot cities in Zambia – the other being Lusaka – within the framework of an assessment methodology for City Region Food Systems.

1.2 Aims

The Kitwe CRFS assessment helped to identify gaps to be bridged and bottlenecks to be opened to create more resilient and inclusive food systems within specific city regions. Special attention was given to the challenges of: i) how to improve access to adequate food for the vulnerable and poor urban population; and ii) how to improve market access for the smallholder farmers in urban, peri-urban and rural areas in the city regions selected. The objective was to focus on an in-depth food system assessment in the city region of Kitwe, using a methodology that has been developed within the project. The methodology adopted an integrated, holistic, food value chain approach in a spatial, rural-urban continuum perspective involving different sectors and various levels of a city region food system, such as sustainability and resilience.

With the longer-term aim of making the CRFS more sustainable and resilient, and improving the livelihoods of rural and urban dwellers in the city region of Kitwe, the assessment examined current and future constraints affecting the local and regional food value chain. It used local knowledge to help explore these constraints in relation to specific sites and to test and adjust new ideas to improve sustainability.

1.3 Phases of the project

1.3.1 Implementation of the CRFS assessment methodology in the Kitwe CRFS

The inception phase involved stakeholder mapping, network analysis and establishing a dialogue process in which a Multi-stakeholder Task Team (MTT) was constituted.

Additionally, a situation analysis (or CRFS scan) of the local context was carried out through a literature review with collection and elaboration of secondary data. Together, this produced a 'snapshot' of both the local and policy contexts, with institutional analysis carried out through a multi-stakeholder consultation process approach. The situation analysis included statistics, case studies, spatial data sets, etc. It also included a participatory mapping process to define and map the local CRFS and facilitation of local multi-level stakeholder consultations to characterise the local CRFS.

1.3.2 In-depth assessment of the Kitwe CRFS

The second phase entailed an in-depth analysis of the key areas of work and critical issues of the local food system that had to be addressed before proposing efficient interventions. In Kitwe, in-depth assessment was conducted in four thematic areas: agricultural production; environment and natural resources degradation; food supply and distribution; consumption and nutrition. Extensive data collection processes were conducted (questionnaire surveys, key informant interviews, focus group discussions) in order to better understand the food system's critical issues. The assessment also included multi-stakeholder consultations to complete and validate the findings.

1.3.3 Stakeholder scenarios and future interventions

The third phase focused on the organisation of different working groups for each of the identified thematic areas, i.e. agriculture production; distribution, processing and marketing; food value chain; and environment and natural resource degradation. The purpose was for the working groups to: (a) select specific strategies based on stakeholder scenario-building exercises; (b) identify and describe potential future interventions – instruments, institutional arrangements, timelines and funding sources; and (c) write up policy briefs based on the results of the assessment and stakeholder consultations.

This report synthesises findings from all three project phases.

2. Project Methodology

2.1 Stakeholder mapping and process management[1]

Preliminary mapping of stakeholders to establish the MTT categorised them into groupings defined by themes and mandate (see Appendix 1). The MTT approved its terms of reference as a knowledge-sharing platform, and the CRFS project was constituted. The membership represented national government, local government, research (fisheries and forestry), civil society, private sector and academia. Subsequently, four meetings of the MTT were held at which various reports were presented, critiqued and approved. Chairing of meetings alternated amongst stakeholders. This ensured buy-in of the dialogue process and coordination of the next meeting by the chairing stakeholder organization. The final meeting of the stakeholder mapping and network analysis of the CRFS project was attended by stakeholders from all ten districts in the Kitwe CRFS. Stakeholders validated the Kitwe CRFS map and the mapping and situation analysis reports (see maps in Section 3 below). The approval of the reports from this phase was an indication that the process had achieved its intended objective of providing a background on the CRFS, establishing a dialogue process and providing information to stakeholders about the CRFS. As this is a continuous process that facilitates the creation of a forum for dialogue or knowledge-sharing platform, the MTT continued to engage with its members and wider stakeholders as well as to provide information and data throughout the process. This is expected to continue after the project.

2.2 Situation analysis phase[2]: definition and scan of the Kitwe CRFS

The situation analysis was prepared through the collection, review and analysis of existing information. Prior to the collection of any secondary information, the MTT agreed a definition of the Kitwe CRFS based on the following elements:

- *Food systems:* 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.
- *Administrative boundaries:* the region of the city over which the Kitwe City Council has jurisdiction (and boundaries of the province over which the provincial administration has jurisdiction) and whose by-laws are applicable within the city region – when urban and periurban agriculture is taken into context.
- *Governance:* potential to establish interventions in terms of producer capacity and improvement of value chain, infrastructure and facilities.

1 This corresponds to the Getting Prepared and Defining the CRFS phases in the CRFS toolkit: http://www.fao.org/inaction/food-for-cities-programme/toolkit/introduction/en/

2 This corresponds to the *Defining the CRFS* and *CRFS Scan* phases in the CRFS toolkit: http://www.fao.org/in-action/food-forcities-programme/toolkit/introduction/en/

2.3 CRFS in-depth assessment phase[3]

2.3.1 Selection and adaptation of indicators to the local context

Once local priorities were identified for in-depth assessment, the most relevant indicators were selected (from the project tool "Design CRFS assessment and data collection")[4] to characterise and monitor trends. A total of 32 data (see Appendix 2) – 16 under agriculture production, 14 under food processing and distribution and two under environment and natural resources degradation – were then adapted to the local context on the basis of the mapping and definition of the Kitwe CRFS project. (Two indicators were relevant to more than one food system area: indicator 9 applied to both agriculture production and food processing and distribution, whilst indicator 32 applied to both food processing and distribution, and environment and natural resources degradation.) The large number of indicators under agriculture production was probably a reflection of inadequate information on the sector with regard to the production of vegetables, livestock, fruit and dairy products. For example, official statistics do not have information on fresh vegetable production areas, food production volumes or the supply and value chains of these products. The process of adapting the indicators to the local context entailed presentation to and discussion by the MTT.

2.3.2 Determination of the main vegetables, fruit, livestock and dairy products

Across all thematic areas, it was decided to focus on only a limited number of priority commodities for the local context and stakeholders. A brief market scan was carried out to determine the most frequently marketed and consumed vegetables, fruit, livestock and dairy products. The MTT was then convened for the purpose of identifying and approving these proposed commodities, which were to be analysed in the context of production sources, distribution, processing, marketing and retail, and the value chain. The selected agrocommodities were:

i. *Vegetables:* cabbage, Chinese cabbage, onion, tomato, egg plants (local), amaranth, pumpkin leaves, rape;
ii. *Fruit:* bananas and mangoes;
iii. *Livestock:* beef, chicken and fish. The full list included beef products (cattle, sausage, whole meat, minced meat), fish (including fingerlings) and chickens (chicks, broilers, layers);
iv. *Dairy products*: milk and eggs.

The classification of what constitutes each main product was according to the national agricultural product classification[5] used by the Central Statistical Office (CSO).

2.3.3 Primary data: information collection and sampling methods

The data collection approach is summarised in Appendix 3. A summary of the data collection methods for each theme are in Appendix 4a and Appendix 4b.

3 This corresponds to the *CRFS Assessment* phase in the CRFS toolkit: http://www.fao.org/in-action/food-for-cities-rogramme/toolkit/introduction/en/
4 Refer to http://www.fao.org/in-action/food-for-cities-programme/toolkit/crfs-assessment/indicator-framework/en/
5 Refer to www.zamstats.gov.zm

Primary data collection method

Individual and private sector respondents were selected by employing questionnaires, interviews and 24-hour diet recall, coupled with focus group discussions. Institutional respondents included those involved in the food value chain for the identified food products.

Households: the 24-hour diet recall data collection method was employed for data related to the type, quantity and frequency of food consumed in the household. Twenty-four hour diet recall data was collected twice a month when enumerators visited the households in the sample. Respondents were asked to recall all food consumed by the household in the previous 24 hours and this was listed on the 24-hour recall data sheets. Information was obtained from an adult who prepared the food; if she/he was not available, another adult who was present during the 24 hours provided the information. Food consumed in the house means food that was prepared in the house and food that was consumed outside the home (this is food consumed by an individual but not prepared in the home). In all cases, interviews were based on a household sample of 75 non-randomly selected households. The 75 households were selected from low-density (25 households) districts, medium-density (25 households) districts and high-density (25 households) districts. The questionnaires included questions regarding the 24-hour diet recall. (See Appendix 4b).

Food value chains: semi-structured questionnaires, with a number of structured questions, were given to a maximum of 10 small-scale and 10 large-scale producers for each food product per district. Retailers (5 small shops + 2 supermarkets), marketeers (10 for large town market), vendors (5 for fruit), catering (1 small + 1 large) and distributors (1) per district. Focus group discussions (FGDs) mainly involved institutional informants and small producers; constituting FGDs amongst marketeers and households has been difficult and time consuming given their limited availability. Focus groups did not exceed 10 members across all informants. Structured questionnaires were administered to institutions/organisations identified as key respondents under each theme. These were later followed up by FDGs.

Infrastructure: maps showing the locations of producers, retailers (shops and markets) and wholesalers, together with infrastructure such as roads and storage facilities, were created by collecting GPS points and using existing street maps. The GPS points were then used to generate maps showing food flows superimposed on them. If any of these combined maps were not presentable and informative, then food flow maps and infrastructure maps were prepared separately (features such as roads and towns were included on both types of map.

Produce value chains: a specialised resource person undertook the definition of the value chain for each selected food product (see list above).

Food area categories: data collection was organised around four food area categories. The methodologies for primary data collection on each food area category are described in the sections below.

i) Agriculture production: land availability, access and tenure, competition between urban development and agriculture, production and productivity issues

The assessment focused on mapping and characterising production of the key commodities, with a particular focus on smallholder producers. More specifically, it assessed the key constraints affecting productivity, production and access to markets of key producers and the implication of farming practices on natural resources and the environment. The focus was on the districts within the core and peripheral regions as the primary focal area. Appendix 3 outlines the sampling method used in collecting information for this food area.

ii) Food processing, supply and distribution system

The assessment focused on characterising the flows of the different commodities from the farm to the retail market and catering. It was also aimed at assessing issues of economic and social sustainability, economic efficiency, employment, inclusiveness, food waste and losses within the core and peripheral regions, which was the primary focal area. In the context of food processing, supply and distribution, only the ten districts of the core region (Chililabombwe, Chingola, Kalulushi, Kitwe, Luanshya, Lufwanyama, Masaiti, Mufulira, Mpongwe, Ndola) were surveyed.

iii) Food consumption and nutrition at city region level

The assessment aimed at characterising food security and malnutrition in the city region: more generally, at the level of nutrition and awareness of the concept of 'sustainable diets'; more specifically, to define the drivers of food insecurity and malnutrition. Data was collected from the districts within the core and peripheral regions, which formed the primary focal area.

iv) Status of environment and natural resources degradation

Assessment of the status of the environment and natural resources in the city region focused on analysis of the impact of agriculture practices and of activities that were neither farm nor food related (e.g. mining) on natural resources and the environment. The analysis focused on the districts within the core and peripheral regions, which formed the primary focal area.

2.4 Policy support and planning

Towards the end of the data collection process, stakeholders were involved in a policy-planning and scenariobuilding workshop. Four working groups were constituted around each case study to identify areas of intervention. Establishment of working groups enabled strategy development and action-plan design for each priority area. The work on value chains was merged with the work on agro-processing, wholesale and distribution. Final agreed priority policy areas were: i) agriculture production; ii) agro-processing, wholesale and distribution (including consumption and nutrition); and iii) environment and natural resources management.

2.4.1 Secondary information

Secondary information was collected from sources that include local authorities, civil society organisations (CSOs), the private sector and published and unpublished materials, including FAO databases. Additionally, existing maps were acquired from local authorities, universities, research institutions and projects for the purpose of analysis and for generating specific CRFS maps.

2.4.2 Analysis of collected data

Collected data were grouped into themes (the four food area categories above) and summarised.

Quantitative data were summarised per theme. GPS data points and corresponding names were mapped to produce maps. All raw data was organised into themes and made available to FAO and local stakeholders.

3. Description of the city region

3.1 Boundaries

The understanding of the Kitwe CRFS was based on the criteria mentioned earlier (see sub-section 2.2). The CRFS conceptualisation (Figure 1) indicates the whole Copperbelt Province as constituting the core and peripheral regions in terms of food production and supply. The definition of the Kitwe CRFS, in terms of geographic boundaries, is depicted in Figure 2.

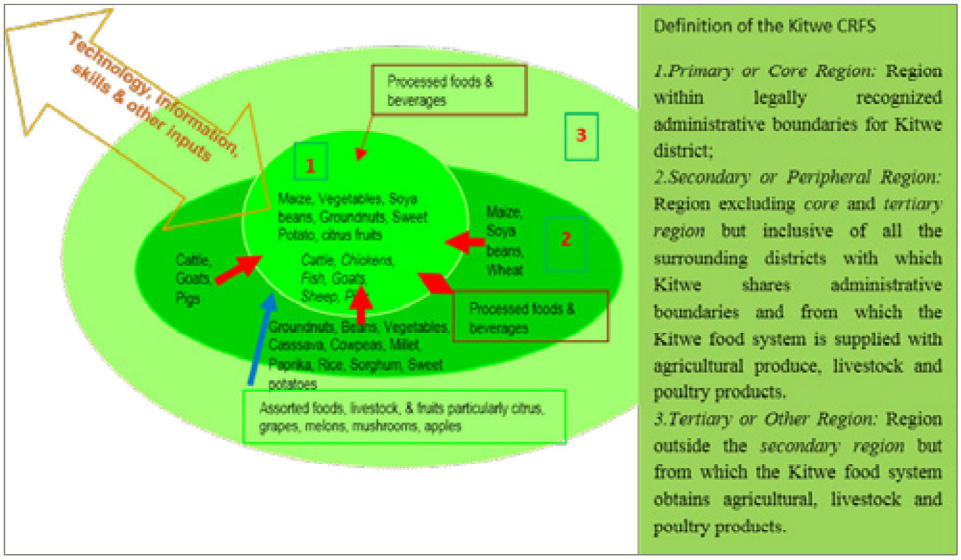


Figure 1:

Movement of foods (processed and unprocessed) in Kitwe CRFS. 1: core region. 2: peripheral region. 3: other region. The core region is not completely influenced by the peripheral region as the other region can interact with the core region without the peripheral region playing a role (Source: this assessment, Situation analysis phase).

Figure 2 illustrates how jurisdictional or geographical boundaries are not the only determinants of a food area. A third dimension to consider is the production sources and supply of each agro-commodity. Some of the commodities are produced within the core and peripheral regions, and then distributed to the 'tertiary or other region' (i.e. all areas outside the Copperbelt Province, including foreign countries). Additionally, there are commodities produced and supplied from outside the core and peripheral regions. The complexity of this wider definition for the Kitwe CRFS can be appreciated from the agro-commodity supply chain maps (Figures 7–10). The city region food system is closely linked to the wider national food production, processing and distribution system based on its exports and imports of food from the tertiary or other region.

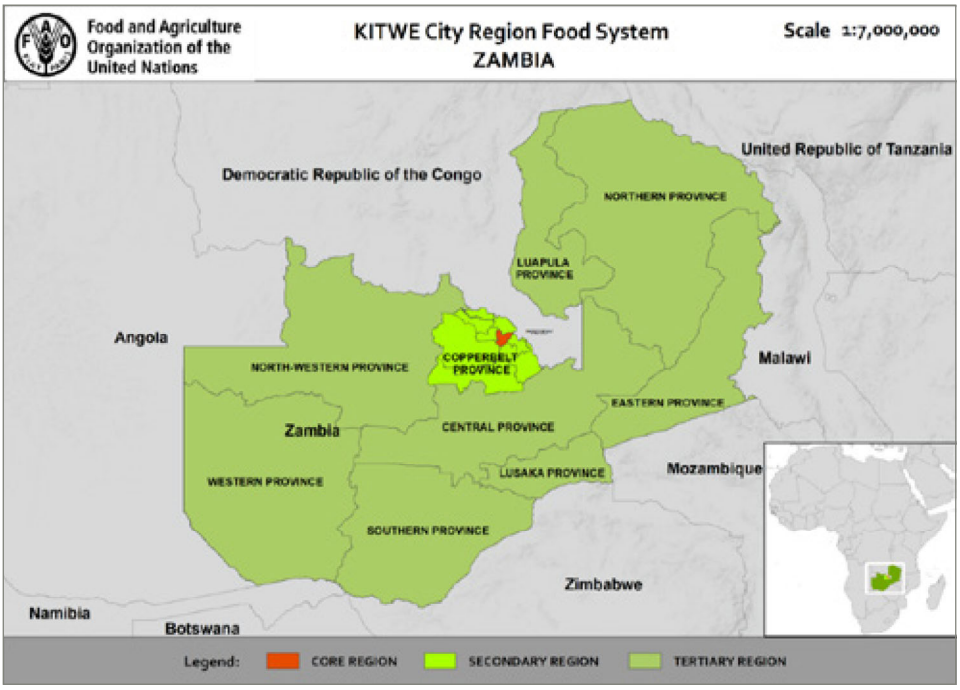


Figure 2:

The Kitwe CRFS geographic boundaries (Source: this assessment, Situation analysis phase).

3.2 Food production areas and markets

The distribution of farms scattered throughout the core and peripheral regions is closely linked to the road network and consumption nodes (Figure 3).

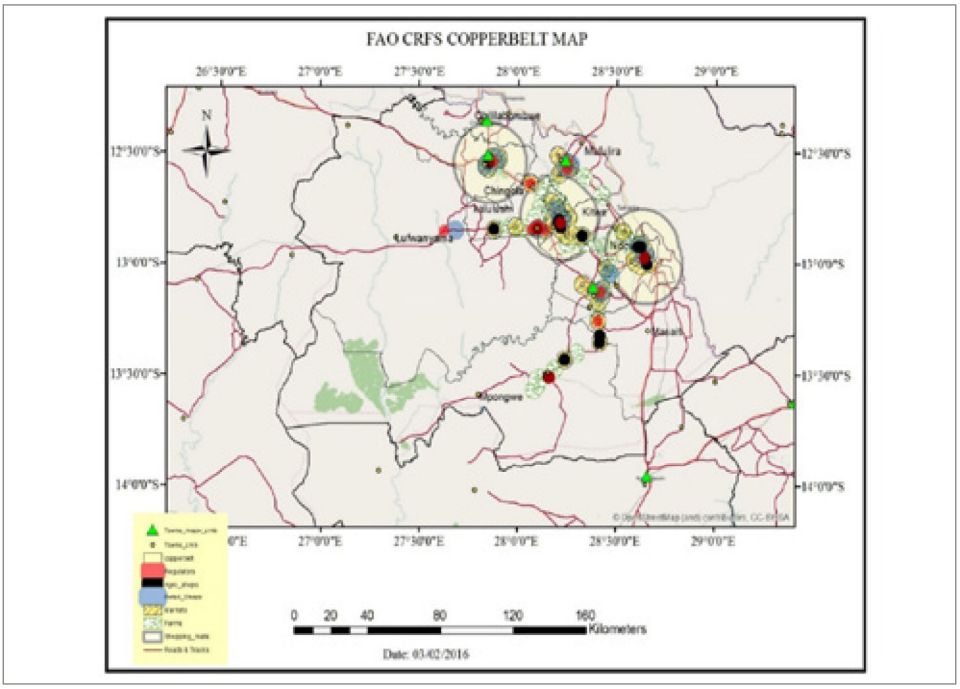


Figure 3:

Location of farming areas, retail points and markets in the core and peripheral regions (Source: this assessment, Situation analysis phase).

4. Brief Social, Environmental and Political/ Institutional Context of the City Region

4.1 Introduction

4.1.1 Population

The Copperbelt Province (Figure 4) is known for its extensive mining industry. Kitwe provides a huge market because of its large population of about 522 092. This is 27 percent of the total population of the province, which is estimated at 1 958 623. The population of the core region grows at a rate of 3.2 percent, which is higher than the national average of 2.8 percent (CSO, 2010). This emphasises the need for the region to improve food production so as to meet the demand. A wide array of both crops and livestock is produced in the region. This, however, does not saturate the market; more food is imported from outside the peripheral region (i.e. the tertiary or other region) to meet the huge demand. Agriculture is mainly practised in the rural districts of Lufwanyama, Masaiti and Mpongwe, particularly during the 1990s. With the collapse in copper production, a large number of people throughout the province (including the urban districts of Kitwe, Kalulushi, Ndola, Luanshya, Chingola, Mufulira and Chililabombwe where mining was prominent) have taken up agriculture as their mainstay (GRZ, 2016). The peripheral region has an estimated population of 1 958 623 of which 166 416 are employed in agriculture, fisheries, forestry and to some extent hunting (Mwitwa *et al.*, 2016).

Figure 4.

Map of the Copperbelt Province and location of Kitwe (core and peripheral regions). (Source: Luanshya Municipal Council, 2010[6]).

6 Luanshya Municipal Council (LMC). 2010. District Situation Analysis. Luanshya, Zambia.

4.1.2 Malnutrition

The depth of food deficit, measured in kilocalories per person per day, has seen a drop from 323 kilocalories in 2004 to 306 in 2013 (http://zambia.opendataforafrica.org/ubcljdg/zambia-food-deficit). Between 2004 and 2014, the number of people undernourished increased from about five million to more than seven million – about 50 percent of Zambia's population. In 2015, 41 percent of households indicated they had two meals a day, whilst 3.7 percent had one meal a day (CSO, 2015a). The proportion of children (3–59 months) who are stunted in the Copperbelt Province was estimated at 48.4 percent compared to 49 percent at national level, with 14.7 percent underweight (13.1 percent nationally) and 6.8 percent wasted (6.6 percent nationally). Stunting, underweight and wasting is higher in rural Zambia (50.3 percent stunting, 13.7 percent underweight and 7.1 percent wasting) than in urban areas (46.5 percent stunting, 12 percent underweight and 5.8 percent wasting) (CSO, 2015a). In terms of people requiring food assistance, FEWS Net (October 2016–May 2017) indicates that 975 738 people (approximately seven percent of the population) required food assistance between August 2016 and March 2017.

4.1.3 Crop production

The Copperbelt Province has a total area of 31 328 square kilometres, of which 9.8 percent is under cultivation. Crops produced include cassava, cowpea, finger millet, maize, popcorn, green maize, mixed beans, paprika, rice, wheat, sorghum, soya beans, sunflower, sweet potato, Irish potato and Bambara nuts. Major horticultural crops include oranges, rape, Chinese cabbage, tomato, onion and green pepper. The leading district in terms of agriculture production is usually Mpongwe, which produces substantial amounts of wheat, maize and soya beans. Major livestock include cattle, sheep, goats, chickens and fish.

4.1.4 Land use

The Copperbelt Province covers an area of 31 328 square kilometres, which is 4.2 percent of the country's total area. Kitwe district covers 777 square kilometres (77 700 hectares) of land, of which 25 700 hectares is arable and 16 000 hectares constitutes forest reserves. The remaining portion is utilised for urban development. The region is subdivided into agriculture blocks and camps[7] – the Kitwe region has three blocks and nine camps. The entire Copperbelt Province has a total of 44 agriculture blocks and 156 agriculture camps that have camp agricultural committees.

4.1.5 Water resources

The Province receives rainfall of more than 1 200 millimetres annually and has continued to do so even in the face of climate change, though there has been a slight reduction in the recent past. In terms of water bodies, the Kafue River is the main reservoir and runs through Chililabombwe, Chingola, Mufulira, Kitwe, Luanshya, Lufwanyama and Mpongwe. Various perennial streams form part of a network of tributaries that traverse the entire region. The major tributaries are Mwambashi, Mienge, Kafulafuta, Luswishi, Mwekera, Kakolo, Kafubu and Chowa.

7 The agricultural camp is the area covered by a single extension officer. It is the lowest level in the extension hierarchy, where there is a direct interface between extension officer and farmers.

4.1.6 Fisheries

The fisheries sub-sector currently employs aquaculture production systems that involve the construction of ponds and establishment of cages for improved and increased fish farming. Mention must be made of the readily available market for fish, both in Zambia and the Democratic Republic of the Congo whose demands are never met by the current production levels. The increasing human population as well as the depletion of fish in some water bodies, especially in the Luapula Province, mean that Zambia still imports fish from Asia, Europe and other African countries (Ministry of Fisheries and Livestock).

4.2 Political and institutional environment in the CRFS

4.2.1 Governance

The political environment governing agriculture and related sectors, such as natural resources, is mainly determined by the ruling government and its policies. Since independence from Britain in 1964, Zambia has inclined towards promoting agricultural production, despite a lack of significant investments in the sector. The inclination has led to the introduction of subsidies such as the Farmer Input Support Programme (FISP), which provided government subsidised inputs for small- and medium-scale farms. Food production in Zambia is synonymous with maize production as it constitutes the primary staple food for more than 50 percent of the population. This excessive focus on maize has shaped the agriculture landscape, though there have been renewed efforts towards crop diversification.

4.2.2 Support for small-scale farmers

The Farmer Input Support Programme (FISP) is a major agriculture subsidy in Zambia. It is a government policy intended to improve agriculture production and improve food security by enabling small-scale farmers to access farm inputs, particularly fertilisers. In 2017, 4.4 percent (ZMW 2 856 million) of the budget was allocated to FISP. In comparison, environmental protection was allocated one percent (ZMW 616 million). The potential impact, which to date has not yet been measured, is over-application to croplands resulting in pollution from synthetic fertilisers and pesticides. Additionally, it can lead to the expansion of agriculture into forested lands.

4.2.3 Key influencers

Institutions that drive or shape agriculture in Zambia include government departments (e.g agriculture, land and finance), local and international civil society organisations (e.g Zambia National Farmers Union, Conservation Farming Unit, Heifer International), donor agencies (e.g. USAID, FAO), traditional leaders and farmers, the private sector (input suppliers and transporters) and research institutions. The Ministry of Agriculture is the principal government ministry that enumerates the policy landscape. There are other government departments whose policies (such as public health, sanitation, taxation of imported and locally produced inputs) influence parts of the food value chain.

4.3 Land policy, tenure and administration

4.3.1 Land policy and legislation

Zambia – and, as a consequence, the Kitwe CRFS – has never had a land policy to guide the overall administration of land, even though the Lands Act of 1995 provides the legislation to do so. The land policy is supposed to be a vision that sets out goals and direction, both for the present and the future. As a result of the absence of a land policy, there is no coordination or discernible cohesive interrelationship between the different pieces of legislation that deal with land. These include the Land Act, the Mines and Minerals Act, the Zambia Wildlife Act, the Environmental Management Act, the Forest Act and the Chiefs Act. This has resulted, in some instances, of conflicting views by different stakeholders on land administration.

Kitwe mostly has state land over which farmers are expected to enjoy security of tenure. However, most of the small-scale farmers are still illegal settlers awaiting titles to land. The peripheral region has plenty of customary land that farmers utilise. Despite land being readily available, security of tenure under customary land is quite compromised as the land is in the hands of chiefs or traditional leaders and is not under state jurisdiction (Committee on Lands, 2012).

As regards access to land by women, only 19.2 percent of privately owned land is under female ownership in Zambia (Anna, 2015). It is also difficult to guarantee access to land in the core region due to high demand and to competition between agriculture and urban development. Much of the peripheral region, however, has adequate land for various agricultural undertakings.

4.3.2 Land administration

A number of pieces of legislation governing the administration of land do exist despite the non-availability of a land policy. These include the Lands Act of 1995, the Housing Act and the Statutory and Improvement Areas Act. In addition, the Land Circular No.1 of 1985 spells out the Principal–Agent relationship between the Ministry of Lands as the Principal and local authorities as agents. Kitwe City Council as well as other councils under the Kitwe CRFS have been such agents. To some extent, presidential pronouncements have played a substantial role as regards land administration in the country, the Kitwe CRFS included.

Land administration has the following multiple players:

a. Planning authorities: these plan for land to be allocated by the Commissioner of Lands. City councils, such as Kitwe City Council, are planning authorities in their own right, whereas District Councils are planned for by the Provincial Planning Authorities.
b. Local authorities: these consider applications and make recommendations to the Commissioner of Lands for allocation.
c. Department of resettlement under the Office of the Vice-President: this office also considers applications to recommend to the Commissioner of Lands.
d. Department of agriculture: the Technical Services Branch has the role of planning agricultural land, such as farm blocks.
e. Traditional leaders: these administer land under customary tenure.

4.4 Competition between urban development and agriculture

The core region which is outlined by the Kitwe city administrative boundaries has its agriculture facing a lot of competition from urban development, that is, the mining industry and other built-in environment. In this line, of the total land area of 77 700 hectares that form the core region, only 25 700 hectares constitute arable land which the built-in environment has also continued to utilize. Therefore, there exists huge competition between urban development and agriculture in the core region. Much of the peripheral region, however, has adequate land for agriculture with Lufwanyama, Masaiti and Mpongwe taking the lead with regard to availability of agricultural land.

5. Describing the City Region Food System (CRFS)

5.1 Who feeds the city region?

This next section is descriptive, with facts and figures on production patterns in the city region. This includes detail on different food commodity prices at various stages in their respective value chains. It is the first time that all this food system data has been collected in one place. The MTT used the data to work on scenarios and develop policy recommendations.

5.1.1 Sources of inputs and other resources

Types of provider: providers of support services play important roles in the performance of food system value chains. They provide critical services to value-chain actors but may not own or purchase the product as it moves towards the end market. Support providers can be from the private or public sector or a civil society organisation. According to FAO (2014) these providers can be distinguished as follows:

1. Providers of physical inputs: these provide physical inputs along the value chain, such as seeds at the production level or packaging material at the processing level.
2. Providers of non-financial services: these provide intangible services along the value chain, such as extension services, research, market information, etc.
3. Providers of financial services: these provide financial services to actors along the value chain.

Types of service: in the Kitwe CRFS, all the abovementioned categories of service provider are present and they play various roles in the value chains of beef, chickens, eggs, rape, cabbages, onions, mangoes, bananas, fish and milk. Keys services that are provided by service providers include supply of inputs, extension service, research, training, financial services, market information and regulating services. These services are provided by private and public sectors, as well as CSOs and non-governmental organisations (NGOs).

Public sector role: the role of the public sector involves providing services such as extension, information, research, training and infrastructure (e.g. roads). It also involves formulating and implementing policies, laws and regulations that affect the performance and competitiveness of the value chains. Public sector roles are implemented by various government ministries, departments and units, such as Department of Agriculture, Zambia Development Agency, Citizens Economic Empowerment Commission, Zambia Bureau of Standards, municipal councils, ZARI, Copperbelt University, Ministry of Livestock and Fisheries, Ministry of Health and Ministry of Commerce, Trade and Industry, Chamber of Commerce and Ministry of Transport and Communication.

Production inputs: apart from land and adequate water to produce vegetables, production requires the seed/seedlings, tools and equipment, fungicides, insecticides and fertilisers. Production inputs play a crucial role in vegetable production. The supply

of these inputs has become a lucrative business as evidenced by the mushrooming of agricultural input supply retail shops, which serve the needs of farmers. The only limiting factor for many small-scale producers is the cost of inputs versus the availability of financial resources. In terms of seedling production, farmers either produce their own or depend on others. The major supplier of seedlings to the Copperbelt is Sunshine Seedlings nursery of Chisamba in Central Province. In Kitwe, Vinco Limited and Swinney are agents. Large-scale producers order their seedlings directly from the Sunshine Seedlings nursery. Self-raised seedlings are much cheaper but the advantages of buying seedlings from a professional nursery are that they are hardy, and the grower saves about four weeks in terms of time. Cabbage seedlings cost ZMW 0.6 each at the nursery in Chisamba and ZMW 1 at the nursery's agent in Kitwe. Local inputs for production are mainly supplied by stockist distributors, who are usually located in most markets within the Kitwe CRFS. Input providers do not usually have contractual arrangements with their trading partners. Actors involved in the production of vegetables include middlemen who operate at the markets.

Production input suppliers: inputs are supplied by various private entities that include agro-dealers such as RIA-Agro, Swinney, Vinco and Farm City. These agro-dealers are stockists for seed companies such as Zamseed, Syngenta, Seedco, MRI-Syngenta, Pioneer, Parnar, Klein Karoo and Monsanto. Producers of agrochemicals, such as pesticides, herbicides, insecticides and fungicides, are also present in the entire Kitwe CRFS – for example, ATS Zambia which is headquartered in Ndola.

Subsidies: small-scale farmers have access to subsidised government inputs through the Farmer Input Supply Programme (FISP). Currently, the inputs are limited to basal and top dressing fertiliser and seeds for maize, groundnuts, beans, sunflower and soya beans. Seeds for rape, cabbage, tomatoes and onions are not part of the inputs supplied under this programme. Inputs supplied through FISP are distributed by Nyiombo Investment Ltd to various districts. Thereafter, local transporters deliver the inputs to farmers in the various agricultural camps.

Support organisations: organisations that provide awareness and communication services include farmer organisations and other civil organisations, such as the Kitwe District Land Alliance, National Traders and Marketeers Association of Zambia, Zambia National Farmers Union, World Vision Zambia and the Sustainable Agriculture Program. While associations relevant to most of the value chains this study looks at are present, these associations often have limited influence and a narrow scope of activities.

Research services: institutions that provide research services are the academic and research institutions/departments, including Copperbelt University, Department of Livestock Development, Department of Fisheries, ZARI, ZCHT and NARDC. These institutions have potential to conduct research that can be vital in improving the roles and functions of different actors along the value chains of rape, cabbages, tomatoes, onions, fish, beef, chickens, eggs, mangoes and bananas. This in turn can improve the performance and competitiveness of the value chains. However, for the most part, research at these institutions and departments is often limited due to financial constraints, given that they are funded by government.

Financial services: formal financial services tend to be provided by commercial banks and micro financial institutions. However, for the most part, access to formal credit is a challenge for small-scale business entities that often lack assets against which these loans can be secured. Further, high interest rates associated with formal credit are also a hindrance to small-scale farmers' access to formal credit. Moreover, banks tend to be reluctant to lend funds to those involved in agricultural activities (e.g. production, processing and trade) due to the high risks involved. According to Olomola and Gyimah-Brempong (2014) adverse selection arises when lenders do not know the particular characteristics of borrowers, especially in terms of their preference for undertaking risk ventures; and in terms of moral hazard, the main problem is that borrowers' actions are not discernible by the lenders.

5.1.2 Relationship between the city region's food supply system and the wider national and global food supply system

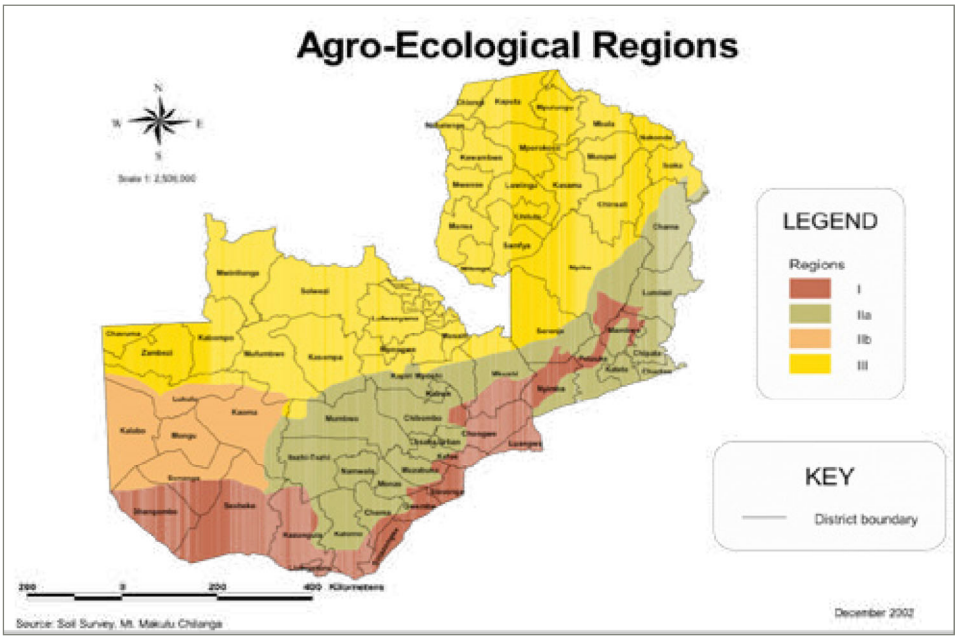
Trade channels: the city region food system is closely linked to the wider national food production, processing and distribution system based on its exports and imports of food from what is termed the 'other region'. The other region is composed of all areas outside the Copperbelt Province, including foreign countries. Among the target agro-commodities included in this study, notable products that are obtained from the other region are primarily meat and meat products, chickens, onions and tomatoes. Food exports from the core and peripheral regions include maize and maize products and livestock and dairy products. These products are exported to the other region (within Zambia) and DR Congo, either in their raw forms or processed. Challenges surrounding the export of these products include informality within Zambia and illegality when dealing with exports to the DR Congo. The bulk of eggs exported into the DR Congo do not go through official channels for Zambia to derive tax revenue. Some of the major linkages between the city region food system and the wider global food supply system deal with supply of manufactured goods, supplier and trader policies, import restrictions, the issue of GMOs, the role of middlemen, the competitiveness of locally produced agricultural commodities, transportation systems and tax and/or tariff system at the local and international level. Trade agreements and global or regional conventions sometimes can also define this relationship.

Environmental factors: as well as being linked through the supply and value chains, the systems are remotely linked in the context of natural resources and environmental degradation. Since the atmosphere is an interconnected whole, anthropogenic impacts on the environment, such as agriculture activities that either harm the environment or contribute to greenhouse gases, in one part of the food system have the potential to impact the city region food system. Notable among these are impacts that contribute to climatic change.

These inter-relationships mean that changes in production, distribution, marketing and pricing systems nationally and globally impact the Kitwe CRFS. This includes issues of governance of agriculture and its input supply chain.

Figure 5:

The three major agro-ecological regions in Zambia (Regions I, II and III)



5.1.3 Sources of food and food production in the city region

The core and peripheral regions are in Agro-ecological Region III and receive an annual average rainfall of more than 1 200 millimetres (Figure 6). In the context of rainfall distribution, the two regions are in the high rainfall belt for Zambia. The major crops cultivated are maize, sweet potatoes, cassava, groundnuts and vegetables (Tables 1–3) (Kitwe District Agriculture Office, 2015). Farmers involved in the production of vegetables tend to specialise in one or two at a time, although a few produce all the four vegetables under consideration in this analysis. Rape production is mostly left to small-scale producers. Cabbages, tomatoes and onions are favoured by large-scale producers. Maize, however, is the main cash crop. The main livestock reared are chickens, cattle, goats and sheep.

Table 1:

Field crops (Source: this assessment, Situation analysis phase).

CROP	NO. OF FARMERS	HECTARES	MARKET OUTLET	COMMENTS FROM PRODUCERS
Maize	7 676	3 838	FRA/Millers	Late rains spoil the grain. Household food security is, however, still assured.
Sorghum	126	63	–	Product is for home consumption.
G/nuts	1 786	223.25	Chisokone/Chikwepe	Groundnuts are sold whilst fresh.
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 is still low.
Sweet potato	1 933	–	–	Produced mainly for home consumption
Cassava	55	–	–	

Table 2:

Horticultural crops – fruit (Source: this assessment, Situation analysis phase).

FRUIT TREES	NO. OF GROWERS	NO. OF TREES	MARKET OUTLET	COMMENTS FROM PRODUCERS
Oranges	82	369	–	Produced mainly for home consumption.
Bananas	107	840	Chisokone	Supply not good enough on the market.
Mangoes	225	716	Chikwepe, Chisokone, Roadside	Seasonal crop.
Guava	27	42	–	Produced for home consumption.
Lemons	138	246	Chisokone, Chikwepe	Lemon demand is often stable; fetch a low price due to customer preferences.
Avocado	123	668	Chisokone	Fetch reasonable price and demand good.
Pawpaw	132	175	–	Produced for home consumption.

Table 3:

Horticultural crops – vegetables (Source: this assessment, Situation analysis phase).

VEGETABLE TYPE	NO. OF GROWERS	HECTARES	MARKET OUTLET	COMMENTS FROM PRODUCERS
Cabbage	140	18.5	Chisokone/ Chikwepe/Bulangililo	Producers of cabbages are doing fairly fine.
Rape	644	29.25	Chisokone/ Chikwepe/Bulangililo	Most preferred vegetable by both growers and consumers.
Chinese cabbage	106	11.25	Chisokone/ Chikwepe/Bulangililo	Producers of Chinese cabbages are doing fairly fine.
Tomato	276	25.5	Chisokone/ Chikwepe/Bulangililo	Farmers are doing fine despite price variations on the market.
Onion	127	14	Chisokone/ Chikwepe/Bulangililo	Ever available on the market and is in high demand.
Eggplant	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.

National statistics do not include concise figures on the production of vegetables and this study did not include them either, due to the lack of appropriate record-keeping by small producers.

Agronomic practices in the city region

A good number of farmers in the Kitwe CRFS still practise conventional farming (e.g. disc ploughing, the burning of crop debris, maize monocropping and shifting cultivation) which, to a great extent, are to the detriment of the farmer and soil quality. This is because they cause colossal land degradation with regard to soil fertility and productivity. Such practices are a great contributor to the low crop yields. Production levels are still very low, at less than 50 percent of the expected regional average of 1.2 tonnes/hectare[8] of maize. Conventional farming is, however, slowly being overtaken by the more sustainable and high yielding conservation agriculture. The major constraints that farmers face include poor road infrastructure, high input cost, lack of credit facilities, poor storage facilities as well as the prevalence of pests and diseases.

Types of fresh food supplied to Kitwe and produced in the CRFS

From consultations and discussions, the major factors influencing access to food supplies include the amount of own production as a region, household income levels, price levels, price seasonality of certain commodities and the physical and governance market structures at play.

The suppliers of fresh foods in the city region range from backyard gardens and small-scale farmers and traders to commercial farmers and traders from the peripheral region, including outside the country in South Africa. Key among these production sources are the rural districts in the core and peripheral regions of Lufwanyama, Masaiti and Mpongwe. Some of the production sources are located more than 50 kilometres from the major and main lucrative markets of the major cities of Kitwe and Ndola (Figures 6–10). The major city region commodities supplied to the markets of the core

8 Data from: http://www.fao.org/docrep/w2698e/w2698e03.htm

and peripheral regions are beef, chicken, fish, cabbage, tomatoes, bananas, oranges, Chinese cabbage, rape, onion, mangoes, eggs, milk and traditional vegetables such as impwa (wild eggplant) and bondwe (amaranth). Unfortunately, it was very difficult to obtain estimates of volumes of these commodities from the interviewees and respondents.

Figure 6 shows the network of markets that are accessible to CRFS producers of fresh vegetables.

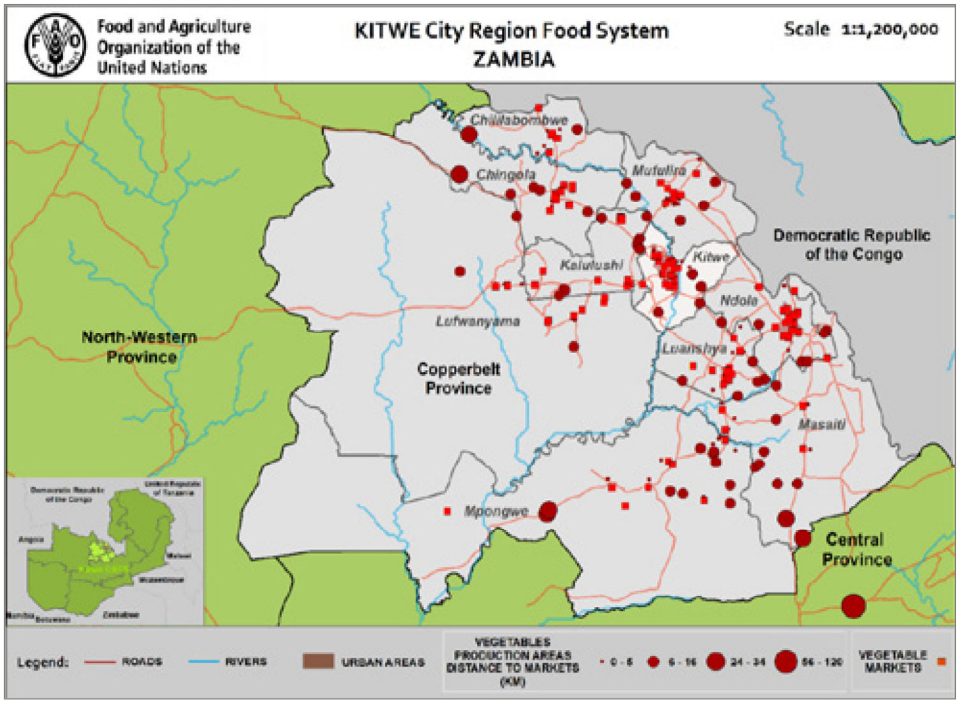


Figure 6:

Vegetable production and average distance to markets (Source: this assessment, in-depth assessment phase).

The high cost of production and the dependence on imports from outside the region (especially South Africa) have made it even more difficult for the local food-processing industries to thrive. The notion that most local products are of poor quality compared to imported products have made the situation even worse. In Kitwe, for example, many processing industries have collapsed – most recently Speciality Foods, which used to manufacture various baking commodities and other foodstuffs. Traditional foods, fruits and vegetables supplied to the region inlcude: ulumanda (vegetable), bondwe (amaranth or wild spinach), ifisongole (fruit) and imfungo (fruit) (Table 4). A few mangoes are also collected from the wild (e.g. from once-inhabited but currently abandoned areas, especially in Lufwanyama and Ndola rural districts).

DISTRICT	LIVESTOCK, DAIRY AND POULTRY	VEGETABLES	FRUITS	OTHER FOODS
Kitwe	Beef, Pork, Chickens, Milk, Eggs, Quails, Goat, Lamb, Fish	Cabbage, Rape Tomatoes, Cucumber, Chinese Cabbage, Onion, Spinach, Pumpkin leaves	Bananas, Apples, Mangoes, Oranges Watermelons, Lemons, Avocadoes	Traditional vegetables (impwa, bondwe), wild fruits

Table 4:

Types of fresh food supplied to Kitwe CRFS (Source: this assessment, Situation analysis phase).

Table 4: Continued

DISTRICT	LIVESTOCK, DAIRY AND POULTRY	VEGETABLES	FRUITS	OTHER FOODS
Ndola	Beef, Chicken, Milk, Eggs and Pork	Tomatoes, Rape, Chinese Cabbage, Onion	Mangoes, Bananas, Apples, Oranges, Guavas	Traditional vegetables (impwa, bondwe)
Chingola	Chickens, Goats, Pork, Ducks, Eggs, Milk	Rape, Chinese Cabbage, Eggplants, Cabbage, Cassava leaves, Pumpkin leaves	Oranges, Apples, Bananas, Mangoes, Pineapples	Traditional vegetables (bondwe, impwa, ulumanda)
Lufwanyama	Beef, Chickens, Pork and Fish	Chinese Cabbage, Rape, Cabbage	Oranges, Bananas, Pineapples, Apples	Traditional vegetables (impwa, bondwe)
Kalulushi	Chicken, Beef, Eggs, Milk, Pork, Fish	Chinese Cabbage, Pumpkin leaves, Cassava leaves, Cabbage, Rape	Mangoes, Bananas, Apples, Oranges	Traditional fruits (amasuku, ifisongole)

Major sources in the distribution process

The major suppliers cited in the distribution processes of the above products are mostly traders and farmers (Table 5, Figures 7–11). More detailed maps showing production sources, purchase/distribution points, markets and retail outlets for the following vegetables can be found in Appendix 5: amaranth (bondwe), cabbage, local eggplant (impwa), Chinese cabbage, onion, pumpkin leaves, tomato and rape.

Livestock products: beef and fish

The livestock sector in Zambia is one of the key economic sectors, with a GDP contribution of 7.4 percent in 2010 (MAL, 2010). It also accounts for about 35 percent of national output (ZNFU, 2012). While livestock includes cattle, fish, pigs, sheep and poultry, the livestock focus in this report is on beef and fish. Main sources of beef and fish in the city region food system are in Figures 7 and 8.

The beef industry contributes less than one percent to Zambia's GDP (World Bank, 2011). Relative to its natural grazing advantages, Zambia has a comparatively small cattle population of about three million head of cattle, which translates into a figure of 0.14 head of cattle per hectare of land suitable for grazing. In 2008, a total of 58 400 tonnes of beef at a value of approximately USD 194 million was produced in the country (World Bank, 2011). Overall, the beef market in Zambia has two segments: standard beef produced by smallholder farmers under a generally low intensity production system, and choice beef produced primarily by commercial farmers and fattened in feedlots (Lubungu *et al.*, 2015). Standard beef makes up 80 percent of total beef demand although it is characterised by high levels of seasonal supply fluctuations, leading to significant seasonal variations in consumer prices. In terms of consumption, beef per capita consumption is lower than elsewhere in sub-Saharan Africa (World Bank, 2011). However, the Ministry of Agriculture and Livestock projects that demand for meat will increase from 120 000 tonnes in 2012 to more than 600 000 tonnes by 2027 due to improved income conditions and expansion of the urban population growth (MAL *et al.*, 2012). With the current production and marketing conditions, this demand growth will create a supply gap of roughly 320 000 tonnes.

Table 5:

Fresh food supply: sources of production and distribution challenges (Source: this assessment, Situation analysis phase).

DESCRIPTIVE	LIVESTOCK: BEEF AND FISH	DAIRY AND POULTRY PRODUCTS: EGGS AND MILK	VEGETABLES: AMARANTH, CABBAGE, CHINESE CABBAGE, LOCAL EGGPLANT, ONION, PUMPKIN LEAVES, TOMATO AND RAPE	FRUIT: BANANAS AND MANGOES
Source of Production	Small-scale and commercial farmers and traders from within and outside the region, i.e. Southern and Western Provinces.	Eggs: from local farms and suppliers from residential places within each town. Milk: produced by small and large-scale farmers; milk-processing companies have purchase points in areas of production.	Production areas: home gardening in rural areas; urban home gardens and open spaces within the city; and peri-urban vegetable production in farms. Suppliers: small-scale and commercial farmers from Lufwanyama, Lufwanyama, Mkushi, Kapiri-Mposhi, Luto, Mkushi, Mufuchani; backyard gardens; farmers and traders from within and outside the region (Lusaka, Luapula, Western Provinces).	Production areas: farms and backyards or around the house. Suppliers: local famers and small-scale farmers and traders; Lufwanyama, Mkushi, Kapiri-Mposhi, Mpongwe & Lusaka, Luapula and Western Provinces, and South Africa.
Challenges	Low investment in fish production; over-fishing in catch fisheries; industrial pollution on the Copperbelt Province, affecting aquatic environment; limited storage facilities; 120 000 tonnes/year demand higher than 65 000–70 000 tonnes annual fish production.	Storage of milk by small-scale farmers who have limited infrastructure and resources.	Demand for these horticultural products increases with urbanisation and increased income; seasonality in supply/ availability.	Extensive product losses due to lack of storage facilities for mangoes; also no processing facilities to absorb most of the production.

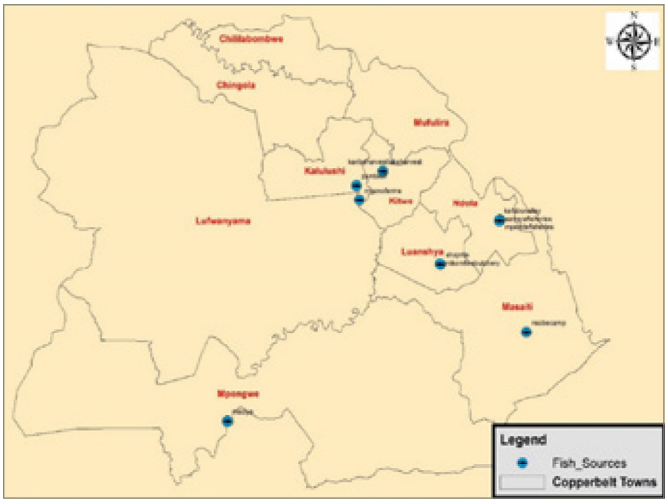
NB: Additional information obtained from Mwiinga (2009); Hichaambwa and Tschirley (2006); CSO/MACO/FSRP urban consumption survey (2007–2008); Nenguwo (2004); Musumali et al. (2009); ZDA (2011); FAO (2009).

Figure 7:

Production sources for beef (Source: this assessment, in-depth assessment phase).

Figure 8:

Production sources for fish (Source: this assessment, in-depth assessment phase).



There are two main types of fishery in Zambia: aquaculture (or fish farming) and 'capture fisheries' (fisheries from a natural water body which has not been farmed). The main types of fish produced from capture fisheries include kapenta (Limnothrissa miodon and Stolothrissa tanganicae) and tilapia – the three-spotted tilapia (Oreochromis andersonii), the long-fin tilapia (Oreochromis macrochi) and the red-breasted tilapia (Tilapia rendalli). Fish production from capture fisheries in the Kitwe city region, within Zambia's boundaries, increased from 40 000 tonnes per annum in the 1960s to more than 75 000 tonnes per annum in 2000 and has since stagnated between 65 000 and 80 000 tonnes per annum. The per capita fish output has declined from 11.4 kilograms to 6.4 kilograms between the 1970s and 2003 (Musumali *et al.*, 2009). The aquaculture fisheries sector produces more than 5 000 tonnes per year, primarily by small-scale producers who constitute 75 percent of the sector. The types of fish that are farmed include the three species of tilapia named above and a number of exotic species, including the common carp (Cyprinus carpio), the Nile tilapia (Oreochromis niloticus) and the red swamp crayfish (Procambarus clarkii). The fish production enumerated above is produced primarily from outside the peripheral region, with the exception of

aquaculture. Total demand for fish is estimated at more than 120 000 tonnes annually (both for local consumption and export) and exceeds the local supply, which amounts to 65 000–80 000 tonnes from capture fisheries and 5 000 tonnes from aquaculture. As the population increases, fish consumption on a per capita basis is decreasing – from 16.5 kilograms in 1971, 8.3 kilograms in 1990, 6.8 kilograms in 1997 to 6.2 kilograms in 2000 (NAqS, 2006).

Dairy and poultry products

Eggs: the poultry industry constitutes 4.8 percent of the agricultural GDP and 48 percent of the livestock sector (Bronkhorst & Chongo, 2015). The industry is anchored on the small and medium enterprises that operate 60 percent of poultry production farms (Bronkhorst & Chongo, 2015). The industry has been consistently growing since 2000 at annual rates of 8 percent and 10 percent for broilers and layers respectively (Bronkhorst & Chongo, 2015). This growth has been attributed to demand and supply factors, including increase in human population, rising disposable income, rapid urbanisation, advances in poultry breeding and advances in technology, thereby boosting production of chicken meat (Bronkhorst & Chongo, 2015).

Estimates by the central statistical office show that 474 165 farmers engage in the production of broilers, layers and village-produced chicken (free-range chicken) (CSO, 2010). Eggs are a poultry product that constitutes an important component of the diet of urban households in Zambia. In 2014, more than one billion eggs were produced – the estimated total national demand was 864 million eggs with 235 million eggs available for export (PAZ, 2014). Table 6 shows that per capita egg consumption in Zambia is estimated at 66 eggs per year (Bronkhorst & Chongo, 2015).

According to PAZ (2014), per capita egg consumption is expected to increase from 73 in 2017 to 77 in 2019. Production sources are scattered all over the regions of the CRFS (Figure 10).

	NO. OF EGGS
Egg consumption (per capita/year)	66
Estimated total national demand	865 million
Total annual production	1.1. billion
Estimated availability for export	235 million

Table 6:

Market size for chicken eggs in 2014. (Source: Bronkhorst & Chongo, 2015.)

Figure 9:

Production sources for eggs (Source: this assessment, in-depth assessment phase).

Milk: milk producers in the Kitwe CRFS (Figure 10) engage in open, semi- and zero-grazing methods because of the small size of farmlands and the inability to provide enough feed for cattle. Yields from this combined grazing method can average 10 to 12 litres per cow per day. Some of the milk produced is sold in the informal market. Pamalat, the international dairy processing company that has a plant in Kitwe, has organised formal channels of collecting the milk for processing and redistribution. The milk production industry is dominated by small-scale farmers who contribute about 60 percent of the total production (ZDA, 2011). It is estimated that 215 million litres are produced per year in the Kitwe CRFS, of which 115 million litres is the share from smallholder dairy farmers (Pandey, 2010; ZDA, 2011). In the recent past, global milk demand has been on the increase, partly due to the rising per capita consumption in the high-density areas of developing countries (Mumba, 2012). Average per capita milk consumption in Zambia is estimated at about 24 litres per year, which is below the FAO recommended level of 200 litres per year (Pandey, 2010). Overall, it is envisaged that increasing income levels are expected to raise the demand for milk and dairy products by more than 1.8 percent per annum (FAO, 2010).

Figure 10:

Production sources for milk (Source: this assessment, in-depth assessment phase).

5.2 Future demand

Overall, the above data suggest some future trends in demand and therefore potential investment opportunities. However, full data for each commodity – and the projected future needs for each within comparible timeframes – was not available and so did not fall within the scope of this study.

5.3 Food processing and manufacturing

Processing of agricultural products is a very limited activity, with the major ones being maize and wheat milling, brewing of opaque beer and to some extent milk processing.

5.3.1 Processing of meat

Kitwe district does not even have an abattoir, but depends on surrounding towns for this service. Slaughtering of animals is done in Mufulira and Chingola. All processed meat comes from outside the region. Beef is mainly produced, processed and distributed by Zambeef. The processing is largely in the production of sausages, whole meat and minced meat. Large chain stores process meat on site; processing may also take place in medium-size supermarkets.

5.3.2 Processing of grains

Kitwe is privileged to have milling companies that are privately owned. In the quest to enhance infrastructure development for smallholder agribusinesses, the Government, jointly with the International Fund for Agriculture Development (IFAD), has embarked on a programme to support food-processing projects with a view to mitigating post-harvest losses and promoting value addition (Kitwe District Agriculture Office, 2015). Furthermore, within the confines of the Government's intention to establish milling plants across the country in a bid to sustain urban food security, Kitwe is among the beneficiaries of this initiative under which a piece of land has already been secured by the local authority towards this venture. This is in a bid to empower small-scale farmers and to control prices of mealie meal (a main staple food) by way of reducing distances from points of maize production to milling plants (Chanda, 2015). In marketplaces, there are also on-site processing machines, such as grinding machines for groundnuts, maize and other cereals.

5.3.3 Processing of fruit and vegetables

It was generally observed from interviews and focus group discussions that little fruit and vegetable processing was being done, despite the potential in this area. The main reason was that many markets lacked proper or adequate storage facilities for preserving fresh fruits and vegetables, unlike big chain store retailers such as Shoprite and Pick n Pay. Furthermore, the few refrigeration facilities that were present charged exorbitant prices for their services due to lack of competition.

The few noted companies attempting to buy the commodities from farmers were mostly from areas outside the core region, such as Lusaka. Large supermarkets have their own private storage facilities.

5.3.4 Processing of milk

All financial data is confidential so the exact cost of dairy processing by Pamalat is unknown. The costs used in this study were estimates based on industry interviews and comparison to international standards. Even though processors manufacture a variety of products (pasteurised milk, UHT milk, milk powder, cheese, yogurt, ice-cream, ghee, butter, etc), this study is only focused on pasteurised milk, the lowest added value product. Processing costs are difficult to determine, given confidentiality in the industry and the difficulty in the allocation of fixed costs. However, an estimate of ZMW 2.2 (USD 0.22 cents) is in line with international benchmarks. In fact, an average cost for a US-based milk processor is ~ USD 0.21 cents per litre and for a processor in Kenya it's ~ USD 0.2 cents per litre (Technoserve, 2008). Notwithstanding similar cost structures, the processor's average profit margins are slightly higher than international benchmarks. The sale price per litre to agents and retailers is K9 per litre. This price includes taxes and packaging costs.

The major stakeholders identified and cited as being very instrumental in the processing of dairy products and poultry products were Parmalat, Zam-Hatch, High Breed (for processing) and small-scale farmers, backyard gardeners, medium-scale and commercial farmers, traders, wholesalers and chain stores (for supply).

5.4 Food wholesale and distribution

The information below is a mix of primary and secondary data collected during the value chain analysis[9], which combined data from interviews, document reviews and market

9 Value chain analysis of selected crops, livestock and dairy products: Kitwe City Region, 2017, Felix Njovu and Jane M. Kwenye (case study still to be published).

surveys. The purpose of this analysis component was to provide information on the players involved in the agriculture food sector in the Kitwe CRFS, from the producers/ farmers and traders to the final consumer. It is primarily descriptive, providing details of the players and the nature of different value chain stages for each specific product's distribution channels (from production to final consumer), including the changes in pricing in Zambian Kwacha (ZMW). It provides a detailed set of baseline data on specific food products: vegetables (rape, cabbage, onion, tomato), fruits (bananas, mangoes), livestock (beef, fish), dairy products (milk) and poultry products (chickens, eggs.)

5.4.1 Vegetables: rape, cabbage, tomato and onion value chain maps

Overview of vegetable distribution and pricing

Tomatoes are produced and distributed within and outside urban areas but are mainly consumed in urban centres. Most of the tomatoes sold in markets are grown and supplied by medium-scale growers within the region, but are also imported from outside the Kitwe city region. The same situation applies to onions. Pricing is influenced by market availability. Wholesale prices for tomatoes are highly volatile. Chisokone market occasionally experiences price variations of 50 percent within one day. Price increases at wholesale level are immediately passed on to the consumer at the retail end. Unfortunately, price drops at the wholesale level do not immediately benefit the retail consumer, only the retailer. There is a measure of stability in the price of cabbages because they have a relatively longer shelf life span than vegetables such as Chinese cabbage. However, quality is a major determinant of price. Of the vegetables under study, onions have the longest shelf life and thus tend to have the most stable price.

Rape

The leaves of oil seed rape are eaten as a vegetable in Zambia. The players in the rape value chain are indicated in Table 7 and Figure 12 shows the distribution channel for this vegetable. Sunshine Seedlings nurseries sell seedlings at ZMW 0.6 per seedling, while the agents sell them at ZMW 1 per seedling. If the grower harvests the rape leaves and takes them to the market, the grower sells a bunch of leaves at ZMW 5. The retailer usually turns this bunch into two smaller bunches and sells each at ZMW 5. Alternatively, the grower may decide to sell a whole bag of rape leaves at between ZMW 70 and ZMW 100 at the farm gate to a trader who sells it on to a retailer at between ZMW 100 and ZMW 150. The consumer will then pay ZMW 2 per ten leaves.

Table 7:

Players in the rape food value chain (Source: this assessment, in-depth assessment phase).

NURSERY & AGROCHEMICAL SUPPLIERS	GROWER	TRADER	RETAILER	CONSUMER
- Nurseries grow and raise seedlings for sale. - Agrochemical suppliers provide the fertilisers, disease prevention and control chemicals, farm implements and advisory services.	Growers are responsible for raising the rape seed or seedlings to maturity.	Traders use bicycles or hired trucks to buy rape from farmers and take it to the market.	- Retailers purchase bags and pockets and subdivide them to meet consumer requirements. - They either have fixed market stalls, are street vendors or are located within a residential area or supermarket. - Sometimes they buy direct from a grower or trader.	Final users of the rape are households, restaurants or other food vendors.

Table 8 and Figure 11 show the value addition, value chain and distribution channels for rape.

PLAYER	AGROCHEM SUPPLIER	GROWER	TRADER	RETAILER
Sells at	ZMW 0.3 to K1	ZMW 70 to ZMW 100	ZMW 100 to ZMW 150	ZMW 200
Unit sold	per seedling	per bag	per bag	per bag

Table 8:

Value chain for rape (Source: this assessment, in-depth assessment phase).

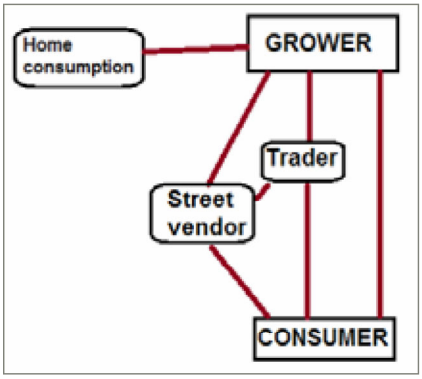


Figure 11:

Distribution channels for rape (Source: this assessment, in-depth assessment phase).

Cabbages

Mature cabbages are either collected by a trader at about ZMW 2.5 per head or delivered to the market by the grower at a slightly higher price of ZMW 3 per head (Tables 9 and 10). The players involved in the growing and distribution channels for cabbages and the food value chain are shown in Figure 13.

NURSERY & AGROCHEMICAL SUPPLIERS	GROWER	TRADER	RETAILER	CONSUMER
- Nurseries grow and raise seedlings for sale. - Agrochemical suppliers provide the fertilisers, disease prevention and control chemicals, farm implements and advisory services.	Growers are responsible for raising the cabbage seed or seedlings to maturity.	Traders use their own transport of hired trucks to buy cabbage from farmers and take them to market.	- Retailers purchase in bulk and break them to meet consumer requirements. - They either have fixed market stalls, are street vendors or are located within a residential area or large supermarket. - Sometimes they buy direct from a grower or trader.	- Final users of cabbages are households, restaurant or other food vendors. - Sometimes they buy direct from a grower or trader.

Table 9:

Players in the cabbage food value chain (Source: this assessment, in-depth assessment phase).

PLAYER	AGROCHEM SUPPLIER	GROWER	TRADER	RETAILER
Sells at	ZMW 0.3 to ZMW 1	ZMW 2.5 to ZMW 3	ZMW 3 to ZMW 4	ZMW 5 to ZMW 7
Unit sold	per seedling	per head	per head	per head

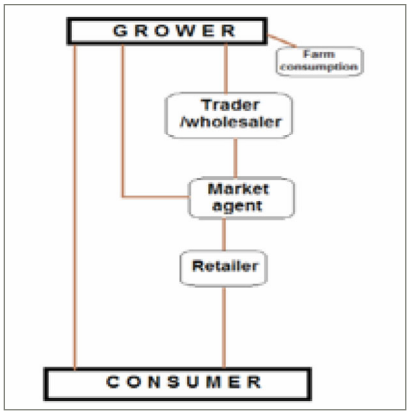
Table 10:

Value chain for cabbages (Source: this assessment, in-depth assessment phase).

The distribution channels for cabbage are shown in Figure 12.

Figure 12:

Distribution channels for cabbages (Source: this assessment, in-depth assessment phase).



Tomatoes

The players in the tomato food value chain are shown in Table 11, while Table 12 shows the value chain.

Table 11:

Players in the tomato food value chain (Source: this assessment, in-depth assessment phase).

NURSERY & AGROCHEMICAL SUPPLIERS	GROWER	TRADER	MARKET AGENTS	RETAILER	CONSUMER
- Nurseries grow and raise seedlings for sale. - Agrochemical suppliers provide the fertilisers, disease prevention and control chemicals, farm implements and advisory services.	Growers are responsible for raising the tomato seed or seedlings to maturity.	Traders use their own transport of hired trucks to buy tomatoes from farmers and take them to the markets.	Agents are responsible for selling tomatoes at the markets.	- Retailers purchase boxes of tomatoes and break them to meet consumer requirements. - They either have fixed market stalls, are street vendors or are located within a residential area or large supermarket. - Sometimes they buy direct from a grower or trader.	Final users of tomatoes are households, restaurants or other food vendors.

Table 12 shows the pricing by each tomato value chain player.

Table 12:

Value chain for tomatoes (Source: this assessment, in-depth assessment phase).

PLAYER	AGROCHEM SUPPLIER	GROWER	TRADER	MARKET AGENT	RETAILER
Sells at	ZMW 0.8 to ZMW 1	ZMW 25 to ZMW 300	ZMW 30 to ZMW 300	ZMW 40 to ZMW 300	ZMW 70 to ZMW 300
Unit sold	seedling	box	box	box	box

The distribution channels for tomatoes are shown in Figure 13.

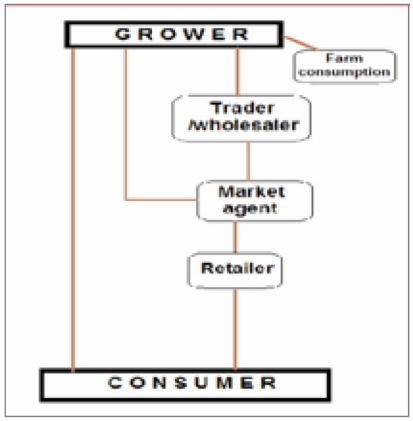


Figure 13:

Distribution channels for tomatoes (Source: this assessment, indepth assessment phase).

Onions

Onions are a common culinary condiment for many Zambian dishes. The major advantage lies in its longer shelf life compared to leafy vegetables and tomatoes. Players and the onion food value chain are indicated in Tables 13 and 14.

NURSERY & AGROCHEMICAL SUPPLIERS	GROWER	TRADER	MARKET AGENTS	RETAILER	CONSUMER
- Nurseries grow and raise seedlings for sale. - Agrochemical suppliers provide fertilisers, disease prevention and control chemicals, farm implements, advisory services.	Growers are responsible for raising the onion seed or seedlings to maturity.	Traders use their own transport of hired trucks to buy onions from farmers and take them the market.	Agents are responsible for selling onions at the markets.	- Retailers purchase bags and pockets and break them to meet consumer requirements. - They either have fixed market stalls, are street vendors or are located within a residential area. - They may buy direct from a grower or trader.	Final users of onions are households, restaurants or other food vendors.

Table 13:

Players in the onion food value chain.

At the market or stalls in the townships, onions sell at between ZMW2 and ZMW4 each, depending on size (Table 14).

PLAYER	AGROCHEM SUPPLIER	GROWER	TRADER	MARKET AGENT	RETAILER
Sells at	ZMW 0.2	ZMW 35 to ZMW 45	ZMW 45 to ZMW 70	ZMW 80 to ZMW 160	ZMW 80 to ZMW 160
Unit sold	seedling	10-kg pocket	10-kg pocket	10-kg pocket	10-kg pocket

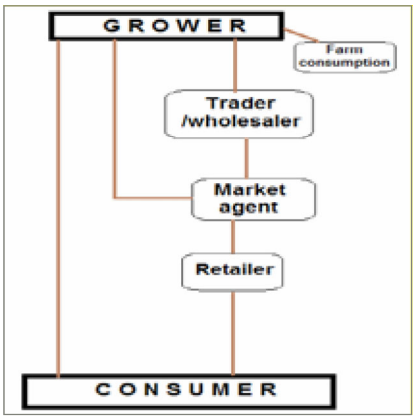
Table 14:

Value chain for onions (Source: this assessment, in-depth assessment phase).

The distribution channels for onions are shown in Figure 14.

Figure 14:

Distribution channels for onions (Source: this assessment, in-depth assessment phase).



5.4.2 Fruit: banana and mango value chain maps

At household level, bananas and mangoes grow as opportunistic crops whereby almost every household has one or two mango trees and banana plants.

Overview for mangoes

Mangoes are seasonal and the first fruits to arrive in the Kitwe CRFS come from the Luapula valley where mangoes mature a bit earlier due to the warmer temperatures. Later, the fruits on the local mango trees also mature. Growing mangoes has not yet been commercialised on the Copperbelt. Mangoes are consumed as fruit with no processing. In the absence of local processing facilities, large quantities of mangoes go to waste as almost every household has a mango tree. Table 15 shows the players in the mango food value chain while Table 16 shows the changes in selling price along the value chain.

Table 15:

Players in the mango food value chain.

MANGO TREE OWNER	TRADER	VENDOR	CONSUMER
Householders own a number of trees that they do not even manage.	Traders buy mangoes from various owners and take them to the market.	- Vendors buy bulk on large dishes and baskets. - They have fixed market stalls or are street vendors. - Sometimes they buy direct from mango tree owners.	- Consumers buy single mangoes for consumption. - Sometimes they buy direct from mango tree owners or traders.

Pricing of mangoes

Mangoes in Luapula are bought at ZMW 1 per five mangoes by traders (Table 16). They pack the mangoes into sacks and sell them to retailers at ZMW 200 per sack (each sack has between 250 and 300 mangoes).

The distribution channels and players in the mango value chain are shown in Figure 15. Some large supermarkets also stock mangoes from South Africa.

PLAYER	TREE OWNER	TRADER	VENDOR
Sells at	ZMW 0.2	ZMW 0.6 to ZMW 0.8	ZMW 2
Unit sold	each	each	each

Table 16:

Value chain for mango (Source: this assessment, in-depth assessment phase).

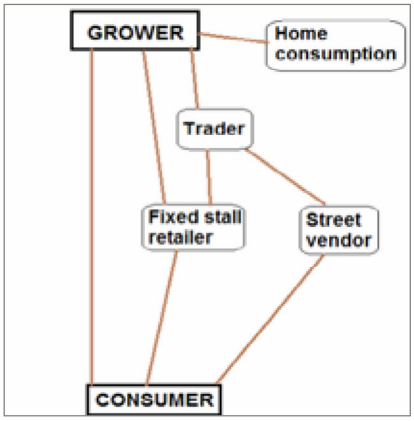


Figure 15:

Distribution channels for mangoes (Source: this assessment, indepth assessment phase).

Overview for bananas

Local banana plantations have been developed despite the occurrence of the bunch head banana virus. The local supply is supplemented by imported bananas that are usually stocked in large supermarkets. Tables 17 and 18 show the local players and the banana food value chain respectively, while the distribution channels are shown in Figure 17.

AGRO INPUT SUPPLIERS	GROWER	AGENT	RETAILER	CONSUMER
- Nurseries grow and raise banana suckers and supply them through agro input suppliers. - Agrochemical suppliers provide the fertilisers, disease prevention and control chemicals, farm implements and advisory services.	Growers are responsible for raising the banana suckers to maturity.	Agents provide storage facilities at the market and sell to retailers.	Retailers purchase 20 or 25 kg boxes and also sell single bananas. - They either have fixed market stalls, are street vendors or are located within a residential area or supermarket. - Sometimes they buy direct from the grower.	Final consumers of bananas are householders, restaurants and other food vendors.

Table 17:

Players in the banana food value chain (Source: this assessment, in-depth assessment phase).

Pricing of bananas

Bananas are packaged in 20-kilogram or 25-kilogram carton boxes or in 23-kilogram plastic crates. The value chain for bananas is shown in Table 18 while the distribution channels are in Figure 16.

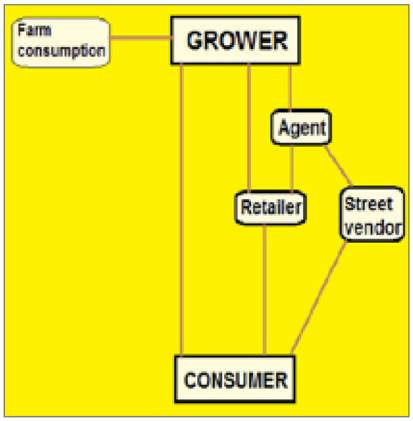
Table 18:

Value chain for bananas (Source: this assessment, in-depth assessment phase).

PLAYER	AGRO-INPUT SUPPLIER	GROWER	AGENT	RETAILER
Sells at	ZMW 10	ZMW 90	ZMW 120	ZMW 220
Unit sold	seedling or sucker	20-kg box	20-kg box	20-kg box

Figure 16:

Distribution channels for bananas (Source: this assessment, in-depth assessment phase).



5.4.3 Livestock: beef and fish value chain maps

Overview for beef Although not a common practice, the rearing of cattle for beef in the Copperbelt Province is beginning to pick up. Traditionally, animals reared for beef were transported by train and trucks from the Southern Province, a practice that has ceased due to the frequent outbreaks of cattle diseases. However, carcasses are still being imported into the Kitwe CRFS. Imported beef is supplemented by beef from a few local farmers who supply the market. Slaughtering is done at Chingola or Mufulira abattoirs. Local processing is restricted to mince and sausage production at the butchery. Tables 19 and 20 show the players and the beef food value chain.

Table 19:

Players in the beef food value chain (Source: this assessment, in-depth assessment phase).

MILLERS, FARMERS & AGROCHEMICAL SUPPLIERS	FARMER	ABATTOIR	TRADER	BUTCHERY	CONSUMER
- Millers manufacture stock feed for cattle. - Agrochemical suppliers provide the nutrient supplements, disease-prevention and control chemicals and accessories, and advisory services. - Other farmers provide bales of grass (hay).	Farmers are responsible for raising the cattle to maturity.	Kitwe has no abattoir. Cows are slaughtered in Chingola and Mufulira.	Traders buy whole carcasses from farmers within and outside the Kitwe city food region.	- Butchers purchase carcasses from farmers and traders for sale in portions and various cuts to consumers. - They are independent or are attached to a supermarket. - They are also involved in basic processing into mince and sausages.	Final users of the beef are households, restaurants and other food vendors.

Pricing of beef

Local beef farmers sell their beef at ZMW 26 per kilogram slaughtered and ZMW 21 per kilogram live weight (Table 20). The distribution channels for beef are shown in Figure 17.

PLAYER	MILLER, FARMER & AGROCHEM SUPPLIER	FARMER	ABATTOIR	BUTCHERY
Sells at	Supply animal feed (millers) & drugs (agrochemical supplier)	ZMW 21 per Kg live weight to ZMW 26 per Kg slaughtered	Service charge	ZMW 35 to ZMW 45
Unit sold	Various	kg	ZMW 30 per animal	Kg for beef cuts

Table 20:

Value chain for beef (Source: this assessment, in-depth assessment phase).

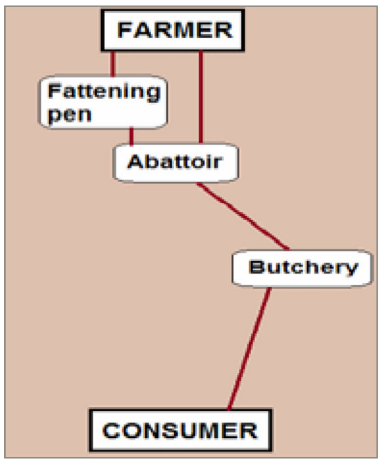


Figure 17:

Distribution channels for beef (Source: this assessment, in-depth assessment phase).

Overview for fish

Large quantities of fish are consumed within the Kitwe CRFS, but little of this fish is locally produced. A large portion of the fish comes from natural fisheries in Luapula Province, Lake Kariba and Itezhi Tezhi as fresh or cured fish. Another source of fish on the market (especially fresh fish) is from the aquaculture sector. Tables 21 and 22 show the key players in the fish food value chain.

NATURAL FISHERY

FISHERMAN	FISHMONGER	RETAILER	CONSUMER
- Fishermen catch fish from natural fisheries using various means.	Fishmongers purchase fish (fresh or cured) from the fishermen and transport to urban markets.	- Retailers purchase fish bundles for sale in smaller quantities as per consumer requirement. - They either have fixed market stalls, are street vendors or are located within a residential areas or supermarket. - Sometimes they buy directly from the fishermen.	Final consumers of the fish are households, restaurants or other food vendors.

Table 21:

Players in the fish food (natural fisheries) value chain (Source: this assessment, in-depth assessment phase).

Fish is sold at ZMW 15 to ZMW 20 by the producers whilst retailers sell a kilogram for ZMW 35 to ZMW 40.

Table 22:

Players in the fish food (aquaculture) value chain (Source: this assessment, in-depth assessment phase).

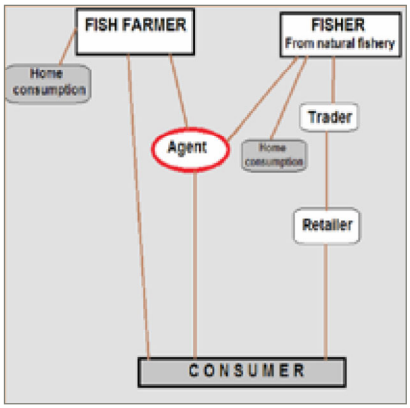
AQUACULTURE				
HATCHERY	FISH FARMER	TRADER/ AGENT	RETAILER	CONSUMER
- Hatcheries produce and raise fingerlings. - They offer advisory services.	Fish farmers are responsible for raising the fingerlings to table-size fish.	Traders and agents provide storage facilities at the market and sell to retailers and also direct to consumers.	- Retailers purchase 10-kg boxes and break them for final consumers. - They either have fixed market stalls, are street vendors or are located within a residential area or supermarket. - Sometimes they buy direct from a fish farmer.	Final consumers of the fish are households, restaurants or other food vendors.

Pricing of fish

The retail price of fish at fish outlets is between ZMW 31.5 and ZMW 40 per kilogram. This fish is obtained at between ZMW 28 and ZMW 34 per kilogram from the wholesaler/ agent. Local fish farmers sell their fish at ZMW 30 per kilogram. However, the market is flooded with imported tilapia, which is much cheaper (Figure 18).

Figure 18:

Distribution channels for fish (Source: this assessment, in-depth assessment phase).



5.4.4 Dairy products: milk value chain maps

Overview for milk

The core and peripheral regions have not been traditional cattle-rearing areas, so cattle are rare in the core region. However, efforts have been made to introduce dairy animals through the Heifer project in Kafubu block and in Kamfinsa. In addition to these, a number of large- and medium-scale farmers are engaged in dairy cattle rearing. Table 23 shows the various players in the milk production and distribution chain.

Other products
Heifer project

	PRODUCTION	PRIMARY TRANSPORT	COLLECTION CENTRE	PROCESSING	TRANSPORT / DISTRIBUTION	RETAIL
PLAYERS	Small-scale producers (<100 Litres per day). Large producers (>100 Litres per day) e.g. Apollo, VK Farm, Kamfinsa Dairy Farm.	Farmers & family members using bicycles & on foot for small-scale producers; trucks & vans for large producers.	2 centres (Kamfinsa & Kafubu) developed under Heifer International project.	One processor i.e. Parmalat.	A number of agents & distributors.	Kiosks, stores & supermarkets.
CONCEN-TRATION			Owned by cooperatives.			Producers & transporters sometimes sell directly to consumers.

Table 23:

Players in the milk food value chain (Source: this assessment, in-depth assessment phase).

Pricing of milk

In the core and peripheral regions, it is important to note that, while prices vary between the formal and informal sector, in general farmers will receive a higher price from informal buyers. This market gets saturated quickly as it is restricted to the neighbourhood. The producer sells milk at ZMW 3 to ZMW 7 while it retails at ZMW 14 per litre. Milk needs to be chilled within hours of milking in order to avoid spoiling.

Estimating the size of the dairy industry, however, is a challenge. Most of the sector is informal and official statistics are not accurate for the formal channel and are non-existent for the informal one. In fact, almost all dairy statistics are estimates. The value chain of both the formal and informal market is fragmented, with a number of players at each step and a low level of vertical integration. In the formal value chain (Kafubu and Kamfinsa), the milk is first transported to primary collection centres for chilling and bulking before being delivered to a processing facility. The informal market connects producers to consumers directly.

Milk price at farm gate varies from ZMW 3 to ZMW 3.5 per litre for small-scale dairy producers, while largescale producers sell at ZMW 7 per litre. The difference is attributed to the available facilities that prolong the shelf life of milk produced by large-scale producers. Milk takes various routes from producers to the end consumer as shown in Figure 19.

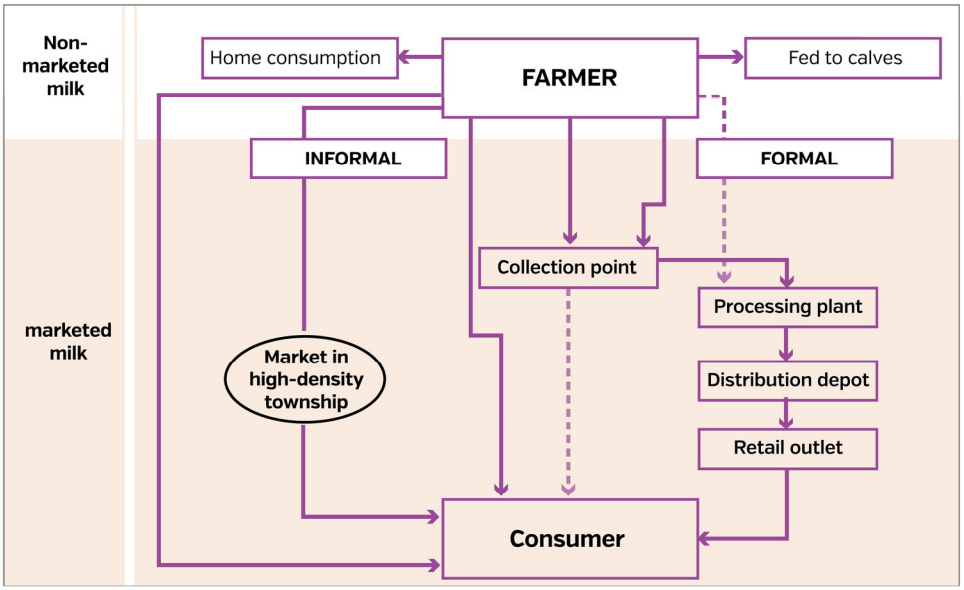
The profit margin at the farm level only becomes reasonable (up to 50 percent) if the farmer has more than ten cows. Major costs are for labour (~50 percent) while other costs include water, depreciation and veterinary treatments.

Primary transportation of milk

For those farmers located far from the collection centres in Kamfinsa and Kafubu, first transportation is usually by bicycle or on foot. The maximum capacity transported on a bicycle is about 40 litres. Then average distance covered ranges from five to 15 kilometres. Milk is delivered in the morning. Milk that flows into the formal channel is usually transported by farmers or family members to a primary collection point in the case of the beneficiaries of the Heifer International project. All other producers have to deliver to the processing plant using any available means of transport. Large farmers (e.g. Apollo of Chingola) have their own dedicated transport. Milk should be cooled within 2–4 hours from the moment it is milked. Primary collection points are most often owned by farmer cooperatives. Producers are usually paid once per month for the delivered milk.

Figure 19:

Milk distribution channels in Kitwe city food region (Source: this assessment, in-depth assessment phase).



5.4.5 Poultry products: chicken and egg value chain maps

Overview for chickens and eggs

Chickens are categorised into broilers and 'village chickens' (free-range chickens that mostly find their own food) – the demand for the latter is increasing as consumers become more health conscious. Only broilers are considered in this analysis. A whole spectrum of suppliers play a part in the supply of broilers from backyard small-scale farmers to large-scale commercial producers. Economies of scale favour large-scale producers in that they make huge savings on transport, vaccines and labour. Table 24 shows the players that are involved in the chicken food value chain.

Table 24:

Players in the chicken food value chain (Source: this assessment, in-depth assessment phase).

HATCHERY	FARMER	RETAILER	CONSUMER
DAY OLD CHICK SUPPLIER AGROCHEMICAL SUPPLIER MILLERS & OUTLETS	Farmers are responsible for rearing broilers.	- Retailers purchase broilers in bulk and sell them individually. - They have fixed market stalls. - Sometimes they buy direct from the farmers.	Final users of the broilers are households, restaurants or other food vendors.
- They supply day-old chicks, nutrition supplements, vaccines, disease-prevention and control medicines, and offer advisory services.			

Pricing of chickens

Producers sell chickens for between ZMW 38 and ZMW 40 to the retailer, who resells them at ZMW 50 each (live) to the consumer. Commercial farmers are able to sell dressed chickens and supply them to supermarkets at ZMW 28 per kilogram.

A village (free-range) chicken fetches between ZMW 40 and ZMW 85 retail. Figure 20 shows the distribution channels for chickens.

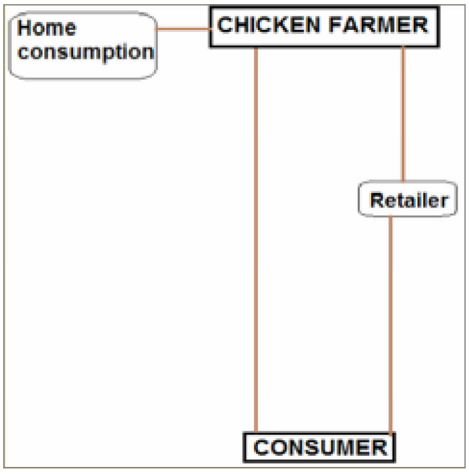


Figure 20:

Distribution channels for chickens (Source: this assessment, in-depth assessment phase).

Pricing of eggs

Egg production and supply (Table 25) within the city region follows similar trends to that of chickens. Medium- and large-scale producers supply this market.

POINT OF LAY PULLET SUPPLIER / MILLERS & AGENT INPUT SUPPLIER	FARMER	AGENT	RETAILER	CONSUMER
- Nurseries grow and raise seedlings for sale. - Agrochemical suppliers provide the fertilisers, disease prevention and control chemicals, farm implements and advisory services.	Farmers are responsible for raising and managing the layers for egg production.	Agents receive eggs at markets and sell them to retailers.	- Retailers purchase trays of eggs and repackage them to meet consumer requirements. - They either have fixed market stalls, are street vendors or are located in a residential area or in a large supermarket. - Sometimes they buy direct from farmers.	Final users of the eggs are households, restaurants or other food vendors.

Table 25:

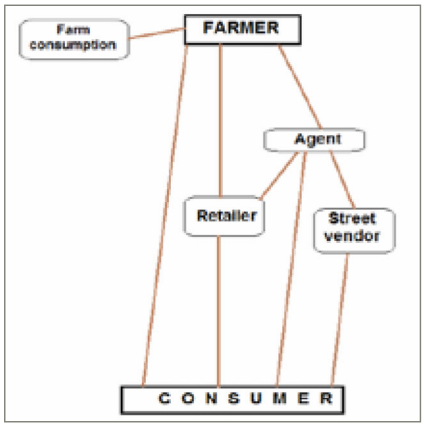
Players in the egg food value supply chain (Source: this assessment, in-depth assessment phase).

The farmer sells eggs at ZMW 15 per tray of 30 eggs. The agents resell a tray at ZMW 20, while the retailer sells them for between ZMW 23 and ZMW 30.

The distribution channels for eggs are shown in Figure 21.

Figure 21:

Distribution channels for eggs (Source: this assessment, in-depth assessment phase).



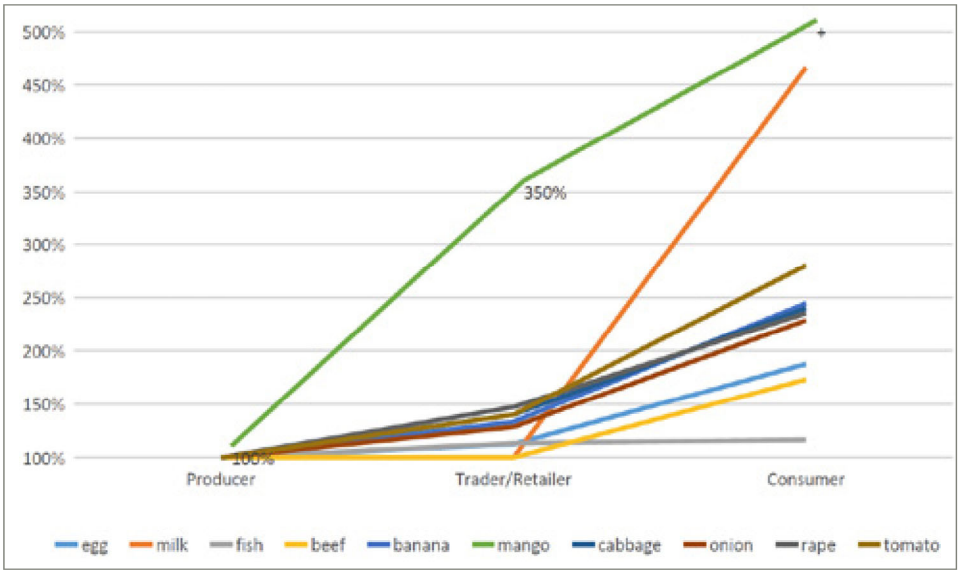
Notable findings

Overall, the analysis shows, amongst other specific findings, that the farmer takes the highest risk and that food production is faced with many uncertainties. In addition, any losses resulting from price fluctuations are also borne by the farmer. A major factor is low productivity as most producers in the region are small scale. The players that gain most are the middlemen (traders) since their investment is very minimal. For foods that are highly perishable, such as tomatoes and fresh fish, the retailer also runs some level of risk when the market is slow because of the lack of proper storage facilities within the value chain.

Figure 22 describes the proportional price increase of each commodity along the value chain. The chart shows a remarkable increase from producer to retail, particularly due to the intermediation of middlemen (agents, traders). In many cases, the agents do not provide a specifc supply and distribution service, nor do they add any value to the product – they simply apply a transaction fee.

Figure 22:

Proportional price increase at different stages of the value chain (Source: this assessment, in-depth assessment phase)



5.5 Food markets, retail and catering

An important aspect of the Kitwe CRFS assessment is to understand where food is sold and purchased. This section looks at the markets and purchasing points of key selected food products. Retail marketing of fresh food products in the Kitwe CRFS is highly diversified: very large wholesale/retail centres, smaller markets serving mostly low and middle income consumers, markets serving almost exclusively high- and middleincome consumers, small independent supermarkets and chain markets, street vendors and traditional shops. An estimate from observations and the data obtained revealed that about 70 percent of all the fresh produce marketed in the region was sold in the open-air markets, whilst supermarket chains and independent supermarkets each held shares of 11 percent and seven percent respectively. The share of street vendors and other outlets were nine percent and two percent respectively. It was further estimated that the dominance of the open-air markets was most pronounced for vegetables and fruit, accounting for about 74 percent of the total fresh food sold (vegetables 80 percent and fruit 20 percent). It was beyond the scope of the report to collect related data for the catering market.

Given that prices increase the further up the chain products are sold, rural producer markets can be assumed to offer lower retail prices than city markets and also to supply commodities to fewer buyers. In contrast,city markets with higher demand create a 'pull effect' on both the volumes sold and the prices paid. The price is partly the reason why poor people and those in rural areas prefer to buy from small markets located in poor neighbourhoods and in peri-urban areas.

5.5.1 Vegetable markets and purchase points

Types of market and purchase points

In the Kitwe CRFS, market systems can be classified either as formal or informal. Formal markets are the supermarkets, hotels, restaurants and marketplaces established by municipalities. For example, there are 26 markets under the Kitwe City Council, located in various suburbs and the Central Business District (CBD). The towns and cities within the CRFS also accommodate supermarkets and other retail shops, hotels, lodges and restaurants as catering facilities. The informal markets include street vending and non-gazetted (unofficial) markets. Whereas the formal system has some decency in terms of sanitation and storage facilities, both market systems are not without challenges, such as accessibility of products, waste management and organisation.

Households in the core and peripheral regions of the Kitwe CRFS purchase or source their vegetables from formal and informal markets scattered across the towns and cities. This is in addition to the vegetables they produce, either in their backyard or in a nearby open space. Informally, vendors either deliver the vegetables to households or sometimes at workplaces. Some of the neighbourhoods in the CRFS have their own local vendors' markets where vegetables are available.

Local products

Amaranth, cabbages, Chinese cabbages, local eggplants, pumpkin leaves, onions, rape and tomatoes are all produced (Tables 37 to 44) in the core and peripheral regions in varying quantities. However, Chililabombwe imports the onions that residents consume.

Leafy vegetables: residents access leafy vegetables from markets located nearby and from roadside markets and street vendors. Wealthy neighbourhoods usually access vegetables from formal markets and shops (small shops and supermarkets). Less than 10 percent of consumers amongst the wealthy sometimes buy their vegetables directly from the producers where agro-commodity prices are even lower than in the retail markets. Multinational retail outlets such as Shoprite, Spar and Pick n Pay do

not normally stock many of the locally produced vegetables. Cabbage is a common vegetable in supermarkets, probably because it has a slightly longer shelf life than many of the leafy vegetables produced locally.

Onions, eggplants and tomatoes: households purchase onions and tomatoes from markets, small shops, supermarkets and vendors. Due to their slightly longer shelf life both onions and tomatoes are sold by a variety of outlets, from small vendors to large multinational supermarkets. Retailers and vendors sometimes pack onions and tomatoes in transparent plastic bags. It is only in supermarkets where onions and tomatoes are sold by weight. Retailers in other formal and informal market outlets sell commodities as a heap or by number. Onions and tomatoes in all outlets (formal and informal) are normally sorted and priced according to size and quality, with the largest and good quality ones attracting a high price. For example:

1. Small, quality local eggplants would cost ZMW 3 (USD 0.3) per pack of 10–15, while larger and goodquality eggplants would fetch ZMW 5 (USD 0.5). Farmgate prices start from ZMW 50 (USD 5.3) per 25-kg bag from small-scale producers and depend on the season.
2. Small-sized red onions can cost ZMW 5 (USD 0.5) for ten onions, while large, good-quality red onions will cost ZMW 10. Farmgate prices start from ZMW 50 (USD 5.3) per 5-kg packet and depend on the season.
3. Large, good-quality tomatoes can cost ZMW 20 (USD 2.1) per 5 to 8 items as a heap, while a medium-sized box (30–35cm high, 30–40cm wide and 40–50cm long) costs as much as ZMW 150 (USD 13.9) when tomatoes are scarce.

Impact on the primary producers

Most vegetable and chicken producers are small-scale farmers who have difficulties in meeting contractual food-supply obligations with supermarkets, hotels, lodges and restaurants. This translates into erratic commodity supplies and any break in the supply chain affects both the availability of agro-commodities to consumers and the household incomes of the producers. In many of the markets managed by municipalities and in informal markets, cartels take up the role of middlemen who hinder the producer from reaching the markets. This hindrance leads to low price differentials for producers, causing demotivated farmers to eventually abandon supplying retail outlets and to suffer low farmgate prices offered by traders instead. Informal markets are usually located along roadsides and in shop corridors where they are subjected to uncontrolled factors. AGRA (2015) points out that many African countries have pushed for increased productivity in agriculture without making an equal push for improved markets, hence resulting in high postharvest losses, high transport costs and a continued vicious cycle of poverty due to elusive food security.

The current scenario in most markets in the Kitwe CRFS is that farmers find their way to major wholesale points from where traders and retailers obtain agro-commodities and reach out to consumers. Middlemen and supermarkets access farm products directly from the farmers who in most cases prefer contractual engagements for a specified time period. Similarly, the Government through the Food Reserve Agency (FRA) and the food processing firms access the produce, especially grain products, directly from farmers to supply to millers who in turn supply retailers.

5.5.2 Fruit markets and purchase points

Types of market and purchase points

Bananas and mangoes are produced in abundance throughout the region, but for bananas the demand outstrips the supply. The purchase points for the two fruits closely resemble that of vegetables and include informal and formal markets as well

as small shops and supermarkets. Supermarkets retail both imported (from South Africa and Zimbabwe, the latter being rare) and locally produced bananas from large producers. Informal and formal markets, including small shops, sell a wider range of banana varieties. The largest consumers of bananas are mainly the middle- and higher-income classes who access the commodity from any retail point. The market price of bananas in formal markets ranges from ZMW 1 per banana to as much as ZMW 5 per three bananas – higher than an informal trader's price. Bananas, like mangoes, are sold by weight in supermarkets.

Seasonal gluts

Mangoes, even though they can be found at any time of the year in supermarkets, are usually seasonal. When there is a seasonal glut, they are found in all types of retail market and even sold at low prices outside private houses. The Kitwe CRFS has a wider range of mango varieties compared to bananas and these are produced by almost every household, even though not all households sell off their excess harvest. Mango is one fruit that highlights the deficiencies in agricultural waste management, particularly in the marketplace. Additionally, this is compounded by a lack of storage facilities for agro-commodities, such as fruits and perishable vegetables. When in season, locally produced mangoes can cost as much as ZMW 1 (USD 0.1) per fruit, depending on the size, with small-sized mangoes costing as much as ZMW 2 (USD 0.2) for four in the market.

5.5.3 Livestock products: markets and purchase points

Beef, chicken and fish are produced, distributed and retailed within the Kitwe CRFS. All three commodities are found in retail points throughout the year.

Beef and beef products

Beef is sold as a fresh product by street vendors (often informal, operating without a licence), in butcheries (such as Zambeef), in large supermarkets (Shoprite and Pick n Pay) and in smaller outlets (such as Kopala Meats and SupaSave). Beef is sold in a range of ways, from whole pieces of meat to minced meat and sausages. Meat is retailed the whole year round and consumption is highest in middle- and high-income households. Low- income households purchase meat on an irregular basis. The largest producer, wholesaler and retailer of meat is Zambeef, which is a vertically intergrated company dealing in cold chain meat and dairy products. Whole meat prices start from ZMW 42 (USD 4.2) per kilogram for steak and more than ZMW 34 (USD 3.4) per kilogram for mixed cut. It is common to find roasted (barbecued) meat being sold at almost all bars within the region.

Chickens

Chickens are produced formally and informally in the Kitwe CRFS. They are produced and purchased from informal sources, such as poultry houses in residential areas, and formally from small- and large-scale farms and dedicated poultry and egg-production firms, such as Golden Lay, Egg Mania, Megga Eggs, Crest Chickens and Zambeef. Chickens are also sold as dressed or live birds and are retailed from producers (dressed and live), markets, small shops and supermarkets.

A live chicken, depending on size and demand, can cost from ZMW 50 (USD 5.0) on credit, while dressed chickens can cost the same or slightly less from producer households. Formal retail outlets such as supermarkets sell dressed chickens by weight. Other poultry products include gizzards, primarily targeted at pets but also traditionally consumed.

Fish

The region has seen a large growth in the production and supply of farmed fish. Notable amongst the producers within the region are Capital Fisheries and Lake Harvest, with

Nsobe Farms located within the peripheral region of the Kitwe CRFS. As with beef, fish is also retailed from the informal (illegally) and formal markets, producer points (e.g. Capital Fisheries) and in supermarkets. Fish has traditionally been preserved by both drying and salting. Dried and salted fish is commonly sold unweighed in informal and formal markets. Salted and dried fish can be sold either per piece or per heap, just as the practice is for fresh fish in the market. The consumption of salted and dried fish is much higher in the region than it is for fresh fish.

The cost per kilogram of fish depends on the type of fish and the season of the year, as farmed fish is sometimes supplemented by fish caught from the CRFS's capture fisheries. Retail prices of fish range from ZMW 22 (USD 2.3) per kilogram for tilapia, ZMW 16 (USD 1.7) per kilogram for mackerel and ZMW 19 (USD 2) per kilogram for fresh kapenta (small fish). Compared to fresh fish, dried and salted fish are consumed in larger quantities by low- and medium-income households and are found in large quantities in all markets as, unlike fresh fish, they do not require refrigeration. A large amount of fish (quantities have not been empirically estimated) is exported into DR Congo. As a result of this large foreign demand from DR Congo, traders and consumers from Chililabombwe, Chingola and to some extent Kitwe have to purchase fish from Kasumbalesa on the border with DR Congo.

5.5.4 Dairy and poultry product markets and purchase points

Eggs

The region produces large volumes of eggs and the distribution network criss-crosses the whole peripheral region. Sources of eggs are producer households, farms and firms such as Golden Lay, Mega Egg, Egg Mania, and Zambeef. Purchase points for eggs vary from informal markets (such as roadside markets), small outlets in residential areas, formal markets and supermarkets. Eggs retailed in formal markets are also sold at wholesale prices at designated wholesale points by producers, middlemen and traders. Medium- and highincome households consume larger quantities per household than low-income households.

Egg-production firms grade their eggs but producer households and small producers do not grade their eggs. Graded eggs vary in price in the supermarkets. A tray of 30 eggs can retail from ZMW 26 (USD 2.7).

Milk and milk products

Milk is produced by dedicated dairy farms (e.g. Cedric Farm) and firms, such as Parmalat, Varun Food and Beverages and Zambeef, within the Kitwe city region. These firms also produce sour milk and cheese. The outlets for milk are mainly formal markets, shops and supermarkets where milk is sold in 500-millilitre and one-litre paper packets and two-litre plastic containers. Milk in paper packets has a longer shelf life. Even though the formal sector offers higher accountability and certainty of sales revenues, some milk is still sold in the informal market. The preference for selling into the informal market is driven by higher prices, instant cash payments and lack of minimum-scale and quality requirements. The informal sector pays in cash on the spot, while processors usually pay later, often at the end of the month. Considering that milk is often the only recurrent revenue for farmers that own dairy cows, the need for cash to cover daily expenses creates a strong preference for producers to sell on the informal market, such as at Nakadoli Market in the highdensity residential area of Kitwe (Figure 20). However, there is no quality control in the informal market, allowing producers to sell poor-quality milk that would be rejected by the processor in the formal channel.

The price to the end-consumer in the formal market (ZMW 14) is uniform throughout the market and can be 400 percent higher than in the informal market. This price differential is, however, somewhat misleading. When processed milk sold in a Tetra Pak is compared

with the equivalent quantity of raw milk, the price differential is no longer that large. There are no price fluctuations depending on the season as the price of processed milk is stable throughout the year. Considering that informal milk is often watered down (informal milk does not get tested and up to 10 percent of water is impossible to detect without specific testers), the difference in price vanishes.

Details on production sources, purchase points and markets for each of the above products in the core and peripheral regions can be found in the case study on agriculture production (in progress).

5.5.5 Catering

The Kitwe CRFS has a number of catering facilities, including restaurants, guesthouses, lodges and hotels. These consume vegetables, livestock and dairy products produced within the CRFS as well as from outside. Catering facilities procure directly from retail for small catering busineses, while suppliers deliver to the largescale catering facilities. Quantities of vegetables, livestock and dairy products, and fruits are difficult to establish, particularly for small-scale catering facilities, and are beyond the scope of this assessment.

5.6 Food storage

Food storage is a crucial aspect of the Kitwe CRFS supply chain infrastructure and serves to protect, preserve, maintain quality and avoid waste of food products. Household food storage is a crucial aspect of resilience and food security for the same reasons, but at a micro-level. The focus here was, however, on types of storage and on general usage rather than the degree of resilience impact.

5.6.1 Households

Results from the survey showed that a total number of 17 different storage facilities were used in different homes from low-, medium- and high-income areas (Appendix 6). These were plastics, jars, colanders, cardboards, sacks, pantries, fridges, freezers, baskets, bins, bowls, shelves, papers, bags, buckets, racks and trays. All these facilities were either used on their own or in a wide array of combinations.

Out of a total number of 1 995 respondents, 37.7 percent (754) used fridges, of which 16.4 percent (327) were from high-income areas, 18.2 percent (364) from medium-income areas and 3.2 percent (63) from lowincome areas. It was also reported that 7.5 percent (149) from the medium-income areas made use of a combination of fridges + racks and fridges + shelves for storing their household food.

5.6.2 Market traders

Traders in the marketplaces stored food in various ways, including cooler boxes, sisal and hessian sacks, carton boxes or simple natural cold technologies but these are not comparable to modernised storage cold rooms and facilities. Chingola district reported about ZMW 8 000 worth of fruit and ZMW 4 000 worth of vegetables is lost per week in a single market. Ultimately, most of the waste food is taken to the appropriate garbage dump by the local council and other contracted companies for disposal.

5.6.3 Common storage practices used in retail

The most common practice for preserving fresh fruit and vegetables involved placing the vegetables in polythene sacks/bags and sprinkling them with water when on display. It was reported that fruit is commonly stored in cool open places, eggs are kept on paper and beef, fish and milk involve the use of cold storage facilities such as cooler boxes with ice and refrigerators (Appendix 6). At the time of the study, there existed only one good-quality milk storage facility owned by the cooperatives.

Methods of storage for each product:

- Fruit: supermarkets use refrigeration in cool places while open markets sprinkle water to keep the fruit fresh and also use proper packaging materials.
- Vegetables: supermarkets use refrigeration in cool places while open markets sprinkle water to keep the vegetables fresh and also use proper packaging materials.
- Meat: supermarkets use refrigeration in cool places while open markets sprinkle water to keep the meat fresh and also use rudimentary methods of dampened, brown woollen sacks and ice cubes to help the meat stay fresh.
- Milk and eggs: supermarkets use refrigeration in cool places while open markets sprinkle water and also use proper packaging materials.

It was also recorded that these methods of storage add little or no value to any of the above-mentioned products.

5.7 Food consumption

Consumption patterns provide information about the general picture of the food system and of food flows within the system. Within the CRFS, the major determinants of consumption patterns are food access and income levels as well as availability, security, transparency, appropriateness and general status of the preferred choices. Consumption of milk was difficult to ascertain from the data collected.

5.7.1 Consumption patterns

Types of diet and food generally consumed

Different foods are consumed by different social and economic classes of people within the CRFS. Some foods are not available to everyone. From the primary data collected, foods such as chicken, beef, fish, milk, eggs, apples, cabbage and Chinese cabbage seem to be mostly available to the high social and economic classes. The low social classes mostly buy foods such as vegetables. In the high- and medium-income classes food consumption is less diverse because buyers tend to be choosy, despite being able to afford a broad range of foods. For these classes, available food quantity and quality is high. In low social and economic classes diversity of food is less because of household budget constraints – a low budget leads to low quantity and compromised food quality.

For a minority from both the higher and lower classes, diets are determined to a degree by the religious beliefs and the lifestyle of individuals.

Meat (beef and pork) and chicken consumption per day

In high-income households, children under five years of age, adults and the elderly consume 0.12 kilograms, 0.36 kilograms and 0.09 kilograms of meat respectively within 24 hours; in low-income households, the figures are 0.08 kilograms, 0.15 kilograms and 0.05 kilograms respectively (Table 26a). In each high-income household, an adult consumes at least three times more meat than a child under five or an elderly person. Meat consumption in high-income households is roughly double the amount in

low-income households. The smaller difference in meat consumption between adults and children in low-income households can be ascribed to the quantity of meat available and probably the size of the household.

Households generally consume less chicken than meat (beef and pork) – on average, 0.4 kilograms of chicken compared with 0.5 kilograms of meat in 24 hours. In high-income households, an adult consumes more chicken (0.31 kilograms) than a child under five (0.11 kilograms) and or an elderly person (0.06 kilograms) (Table 26b). In low-income households, a child under five eats more chicken than an elderly person but half what an adult consumes.

Egg consumption per day

Egg consumption patterns mimic those of meat and chicken as adults in high-income households eat twice the number of eggs that children under five eat (Table 27a). The pattern of egg consumption in high-, medium- and low-income households does not reflect major differences. This can be attributed to the size of the sample and probably the choice of households that were included in the 24-hour diet recall study.

Vegetable consumption per day

In low-income households, children under five, adults and the elderly eat more vegetables than their counterparts in both high- and medium-income households (Table 27b). However, mean consumption is the same for medium- and low-income areas when age is not a factor.

Fruit consumption by children

Children from low-income households consumed more than five bananas and five mangoes per day. Mangoes are, however, only seasonally available and this statistic is not applicable over the whole year.

	MEAN BEEF CONSUMPTION IN 24 HOURS IN THE HOUSEHOLD (NUMBER IN KG FOR HOUSEHOLD)				
RESIDENTIAL AREA INCOME CLASSIFICATION	MEAN CONSUMPTION	CHILDREN UNDER 5	ADOLESCENTS	ADULTS	ELDERLY
High Income	0.6 (0.08)	0.12 (0.03)	0.22 (0.04)	0.36 (0.05)	0.09 (0.03)
Medium Income	0.54 (0.07)	0.12 (0.03)	0.22 (0.03)	0.33 (0.05)	0.07 (0.02)
Low Income	0.24 (0.05)	0.08 (0.02)	0.1 (0.03)	0.15 (0.03)	0.05 (0.02)
Total	**0.46 (0.04)**	**0.11 (0.02)**	**0.18 (0.02)**	**0.28 (0.03)**	**0.07 (0.01)**

Table 26a:

Mean beef consumption in 24 hours per household (Source: this assessment, in-depth assessment phase, from the 24-hour diet recall survey).

	MEAN CHICKEN CONSUMPTION IN 24 HOURS IN THE HOUSEHOLD (NUMBER OF CHICKENS)				
RESIDENTIAL AREA INCOME CLASSIFICATION	MEAN CONSUMPTION	CHILDREN UNDER 5	ADOLESCENTS	ADULTS	ELDERLY
High Income	0.45 (0.08)	0.11 (0.02)	0.11 (0.02)	0.31 (0.05)	0.06 (0.02)
Medium Income	0.46 (0.07)	0.11 (0.02)	0.11 (0.02)	0.3 (0.05)	0.06 (0.02)
Low Income	0.25 (0.05)	0.09 (0.02)	0.09 (0.02)	0.16 (0.03)	0.07 (0.02)
Total	**0.39 (0.04)**	**0.1 (0.01)**	**0.1 (0.01)**	**0.26 (0.03)**	**0.06 (0.01)**

Table 26b:

Mean chicken consumption in 24 hours per household (Source: this assessment, in-depth assessment phase, from the 24-hour diet recall survey).

Table 27a:

Mean eggs consumption in 24 hours per household (Source: this assessment, in-depth assessment phase, from the 24-hour diet recall survey).

	MEAN VEGETABLE CONSUMPTION IN 24 HOURS IN THE HOUSEHOLD (NUMBER OF BUNDLES)				
RESIDENTIAL AREA INCOME CLASSIFICATION	MEAN CONSUMPTION	CHILDREN UNDER 5	ADOLESCENTS	ADULTS	ELDERLY
High Income	2.5 (0.1)	0.7 (0.1)	1.0 (0.1)	1.8 (0.1)	0.6 (0.1)
Medium Income	3.1 (0.1)	1.0 (0.1)	1.5 (0.1)	2.0 (0.1)	0.6 (0.1)
Low Income	3.0 (0.1)	1.4 (0.1)	1.6 (0.1)	2.0 (0.1)	1.0 (0.1)
Total	**2.9 (0.1)**	**1.0 (0.1)**	**1.4 (0.1)**	**2.0 (0.1)**	**0.8 (0.1)**

Table 27b:

Mean vegetables consumption in 24 hours per household (Source: this assessment, in-depth assessment phase, from the 24-hour diet recall survey).

	MEAN EGG CONSUMPTION IN 24 HOURS IN THE HOUSEHOLD (NUMBER OF EGGS FOR HOUSEHOLD)				
RESIDENTIAL AREA INCOME CLASSIFICATION	MEAN CONSUMPTION	CHILDREN UNDER 5	ADOLESCENTS	ADULTS	ELDERLY
High Income	2.75 (0.24)	0.79 (0.13)	1.09 (0.14)	1.46 (0.19)	0.23 (0.09)
Medium Income	2.43 (0.28)	0.53 (0.11)	1.15 (0.15)	1.43 (0.20)	0.35 (0.10)
Low Income	2.04 (0.23)	0.60 (0.15)	0.74 (0.11)	1.14 (0.15)	0.34 (0.10)
Total	**2.40 (0.15)**	**0.63 (0.08)**	**0.99 (0.08)**	**1.34 (0.11)**	**0.31 (0.06)**

(All data from surveys conducted by project team, 2017. The 24-hour diet recall data collection method was employed for data related to the type, quantity and frequency of food consumed in the household. Diet recall data was collected twice a month from a household sample of 75 non-randomly selected households from low density (25 households), medium density (25 households) and high density (25 households) per district.)

5.7.2 Presence of local cooking training programmes

Fewer than five percent of individuals in the Kitwe CRFS undergo formal training to acquire cooking skills and as many 91 percent acquire these skills at home. About four percent and three percent of respondents in high-income and low-income households respectively have acquired cooking skills through formal training, while the rest have either learned how to cook at home or have taught themselves (Table 28).

Table 28:

Method of acquiring cooking skills at household level (Source: this assessment, in-depth assessment phase).

	HOUSEHOLD INCOME CLASSIFICATION		
METHOD OF ACQUIRING COOKING SKILLS AT HOUSEHOLD LEVEL	HIGH	MEDIUM	LOW
Formal training	4% (7)	3% (5)	3% (6)
Learned at home	81% (141)	85% (160)	91% (159)
Self-taught	15% (26)	11% (20)	6% (10)

5.7.3 Availability of local and traditional agro-products in different income areas

The availability or supply of local and traditional agro-products was mostly year-round for 73.4 percent, 50 percent and 53.1 percent in high-, medium- and low-income households

respectively (Table 29). In the height of seasonal availability, 21.9 percent, 31.3 percent and 36.7 percent of households obtained local and traditional agro-products. High-income households seem to have better access to agro-products, probably because they can afford to pay more and do not just rely on market availability. Examples of local and traditional agro-products include mushrooms, vegetables and fruit that are seasonally produced – fruit includes mangoes, guavas, bananas, mulberries, papaya and a large number of wild fruits, such as *Uapaca kirkiana.*

	HOUSEHOLD INCOME CLASSIFICATION		
AVAILABILITY OF LOCAL AND TRADITIONAL AGRO-PRODUCTS TO HOUSEHOLDS	HIGH	MEDIUM	LOW
None	3.2% (9)	1.3% (4)	1.3% (4)
Seasonally	21.9% (61)	36.7% (114)	36.7% (114)
Unknown	1.4% (4)	9.8% (30)	9.8% (30)
Year-round	73.4% (204)	53.1% (163)	53.1% (163)

Table 29:

Availability of local and traditional agro-products to households in different income areas (Source: this assessment, in-depth assessment phase).

5.7.4 Availability of local and traditional crops in different income areas

Local and traditional crops (for example, pumpkin leaves, cassava leaves, bean leaves and sweet potato leaves but not cabbage, Chinese cabbage and rape) are seasonally available to 46.6 percent of high-income households and 53.4 percent of both medium- and low-income households (Table 30).

	HOUSEHOLD INCOME CLASSIFICATION		
AVAILABILITY OF LOCAL AND TRADITIONAL CROPS TO HOUSEHOLDS	HIGH	MEDIUM	LOW
None	3.9% (11)	2.2% (7)	2.2% (7)
Seasonally	46.6% (131)	53.4% (172)	53.4% (172)
Unknown	11.7% (33)	17.1% (55)	17.1% (55)
Year-round	37.7% (106)	27.3% (88)	27.3% (88)

Table 30:

Availability of local and traditional crops in different income areas (Source: this assessment, in-depth assessment phase).

5.7.5 Trends in food choices and preferences

Fresh fruit and vegetables

There has been an increase in the consumption of fresh fruit and vegetables as people are becoming more aware of the health benefits of eating a diet rich in these foods. This has been attributed to the increase in diet-related illnesses and complications within the city region as reported by nutritionists.

'Local' products

Middle- and high-income households can more easily access to food produced within the city region because farmers bring their produce to markets and traders/middlemen buy produce either at the farmgate or at a distribution or wholesale point. Some of the production places that are sources of locally produced agro-commodities include Lufwanyama, Masaiti, Kakolo, Ipafu, Mudenda and Muchinshi.

5.7.6 Access to safe and appropriate food retailed and consumed in the city region

Before reaching the consumer, some of the foods consumed in the city region need to be either transported, processed or distributed from elsewhere. This has the potential to affect food quality, food safety and food security, especially when the supply chain is too long and perishable foods take longer to reach the consumer. This risk becomes more serious in the context of poor transportation, road infrastructure and food storage facilities in the city region. A successful food system not only produces and delivers healthy food to the consumer, but is also structured so that this food is accessible to everyone within the shortest possible time from a good storage facility or distribution point. Food purchase points within the city region include: the farmgate; distribution or wholesale points; designated places in the formal markets, informal markets, and supermarkets; and wholesale and retail shops. Some of these facilities play multiple supply-chain functions, such as processing points, storage points, distribution and wholesale points, retail points or a combination of any of these functions. It is therefore important that these facilities provide the consumer with easy access, food availability and types of food that are appropriate for the city region. Seasonal vegetables, chicken and beef are the most consumed foods and access to them is fairly possible from several markets as well as catering and retail facilities. However, there is room for expansion and diversification of the city region food marketing, catering and retail sector.

Respondents within the core and peripheral regions indicated that the drivers of food insecurity within the city region were poverty, unemployment, shortage of cooking skills, lack of technical knowledge and restricted access to capital.

5.7.7 The food basket and nutritional aspects in the city region

Wider determinants of good nutrition

The need for good nutrition is understood – it's essential for healthy and active lives and also has a direct bearing on an individual's intellectual capacity, which ultimately impacts on the social and economic development of any nation (GRZ, 2011). The underlying principle is the practical application of appropriate diet and healthy lifestyles. These are dependent on stable and sustainable food security, supply and availability, quality catering practices, a healthy environment and affordability. Nutrition is further defined as encompassing the processes of accessing food, consumption and utilisation of nutrients by the body. These factors are supplemented by an individual's access to good- quality health services. In Zambia, the nutrition situation has, however, remained generally poor, a result of a myriad of complex social economic and cross-cutting issues.

The Kitwe city region food basket

This is composed of vegetables (a kilogram), cooking oil (local; 2.5 litres), dried beans (a kilogram), dried bream (a kilogram; fish), dried kapenta (a kilogram; small fish), fresh milk (500 millilitres), onion (a kilogram), shelled groundnuts (a kilogram), table salt (a kilogram), tomatoes (a kilogram), corn meal (25 kilograms) (CSO, 2015a). The basket's frequency of access depends on household income. The cost of the food basket has increased from ZMW 258.42 in 2004 to ZMW 686 in 2015, an increase of 165 percent. Households within the core and peripheral regions, during the 24-hour diet recall study, indicated that the level of awareness is not good or satisfactory in terms of healthy diets, although the awareness of balanced diets is fair.

Stunted children (aged five and below) from 1992–2014 in the regions

The core and peripheral regions had a stunting rate of 44 percent in 2013 (Figure 23), which rose to 48.4 percent in 2015 (CSO, 2015a). In parts of the tertiary or other region 56 percent of children from five years old and below were stunted.

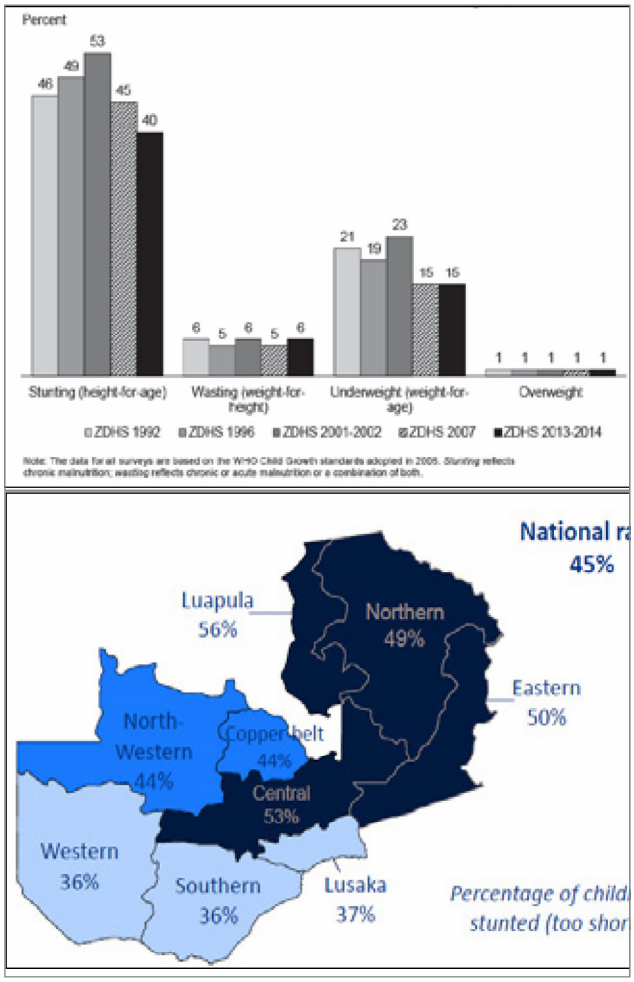


Figure 23:

Percentage of children under 5 years who are stunted, wasting, underweight, overweight 1992–2014 (top) and provincial rates of stunting (below). (Source: CSO, 2013.)

5.8 Food and organic waste management

5.8.1 International recommendations

Recommendations of UNECA (2009)[10] based on a review of waste management in Zambia (including Egypt, Ghana and Kenya) allude to key elements, relevant to agri-waste in the CRFS, pertaining to *Develop waste management systems and extend waste service coverage:*

i. Capacity building training – *training of various stakeholders in environmentally sound waste management techniques using existing institutions*

ii. Public awareness – *mount strong public awareness campaign on impact of different types of waste on human health to increase community participation*

10 UNECA. 2009. African review report on waste management. Main Report. 27–30 October 2009. Economic Commission for Africa. 6th Session of the Committee on Food Security and Sustainable Development (CFSSD-6)/Regional Implementation Meeting (RIM) for CSD-18. Addis Ababa. Ethiopia.

iii. Staff and equipment – *increase number of qualified staff to operate waste management systems and equipment*

iv. Monitoring – *establish special bodies to monitor, report and follow up the quality and quantity of waste and their fate*

v. Waste characteristics – *generation rates and waste data and characteristics on types, sources and composition of waste has to be improved*

vi. Waste management practices – *segregation of waste components from point of generation*

vii. Collection system – *increasing collection efficiency of waste and their collection and transportation services*

viii. Transportation – *important to create transportation system for waste from rural and urban areas*

ix. Recycling – *appropriate incentives to promote usage of recycle, recyclable and/or biodegradable items*

x. Recovery – *scope of agriculture waste reuse or recycling as a source of energy, briquetting, composting, biogas production, ethanol production and animal fodder*

xi. Land filling/dumpsites – *disposing of wastes carried out in controlled landfills.*

5.8.2Current situation

None of the jurisdictions in the CRFS fully complies with any of the recommendations above. However, solid waste management systems and companies, such as CopWaste, exist. In terms of solid waste generation from markets, it was difficult to come up with volumes of waste generated for the agro-commodities in question as traders and local authorities do not maintain good records of quantities generated per agro-commodity. Some studies indicate that 0.3 kilogram (50 percent), 0.23 kilogram (45 percent) and 0.11 kilogram (25 percent) per capita daily food waste generation occurs in low-, medium- and high-density areas of Ndola respectively (Edema *et al.*, 2012)[2]. Garden waste was reported to be 0.18 kilogram (30 percent), 0.1 kilogram (20 percent) and 0.18 kilogram (40 percent) per capita per day in low-, medium- and high-density households respectively. In general, Ndola has been estimated to generate 3 915 tonnes of waste per month. The Ndola City Council reported that 70 percent of all waste generated in the city is organic waste. In Kitwe, the average monthly waste generated is approximately 6 159 tonnes, out of which 75 percent (nearly 4 620tonnes) of all waste generated is assumed to be organic waste and about 65 percent (about 3 050 tonnes) of the total organic waste is food (Kitwe City Council, 2016)[3]. Information in terms of the amount of waste generated at household level was generally lacking. Similarly, agricultural waste from livestock, poultry and dairy products was not ascertained due to difficulties in assessment and record keeping at the municipality, trader, catering and producer levels.

Tomatoes, Chinese cabbages, cabbages, rape and onions are most dominant in the total amounts of food waste during the months of June–October because this is the season when these foods are readily available on the market. In terms of household waste, there are three ways in which households handle waste:

i. Collection from premises by service providers, such as CopWaste

ii. Burying in dug pits

iii. Dumping at designated places.

2 Edema, M., Sichamba, V. and F.W. Ntengwe. 2012. Solid waste management – case study of Ndola, Zambia. International Journal of Plant, Animal and Environmental Science. Vol. 2(3), 248–255.

3 Kitwe City Council. 2016. Public Health Unit.

5.8.3 Quantity of food wasted from households within the region according to

income areas Medium-income areas generate the largest amounts of waste in a month, amounting to 185 kilograms per household; the figure for low-income areas is 175 kilograms and for high-income areas is 174 kilograms (Table 31).

INCOME CLASSIFICATION	MEAN	N	MINIMUM	MAXIMUM	SD
High income	7.79	174	0	500	38.32
Low income	4.12	175	0	50	9.23
Medium income	5.62	185	0	80	11.04
Total	**5.84**	**534**	**0**	**500**	**23.42**

Table 31:

Monthly quantity of wasted foods from households in kilograms in Kitwe. N = number of observations; SD = standard deviation. (Source: Kitwe City Council, Public Health Report, October,

Survey data from households in the CRFS indicated that high-income areas generated 7.8 (±2.9) kilograms, medium income 5.6 (±0.8) kilograms and low-income 4.1 (±0.7) kilograms food waste per month.

Generally, the results obtained from the interviewed respondents of the survey as well as the district councils (Luanshya, Masaiti, Ndola, Mpongwe, Kitwe, Kalulushi, Lufwanyama, Chingola, Mufulira and Chililabombwe) revealed that the largest quantity of wasted foods was from the markets, approximating to 903 tonnes per month.

5.9 Who governs the city region food system?

The agriculture sector is primarily governed by policies and legislation developed and implemented through the Ministry of Agriculture. Other sectors, such as environment, fisheries, forestry, land, mining and water, also have legislation that affects the way agriculture is governed. Zambia has no land policy even though land is governed by the Lands Act of 1995. The principal governing policy is the National Agriculture Policy (2012–2020), which has the primary aim of ensuring that agriculture contributes to reducing poverty and increasing household incomes. With regard to the general environment, the policy aims at ensuring *sustainable utilisation of the natural resources and the environment, and the promotion of environmentally friendly farming systems*. Locally, and within each municipal jurisdiction, agriculture is also governed through local council by-laws.

5.9.1 Stakeholders of food system governance

The major stakeholders with a presence in the city region and role in the food system include government departments, statutory bodies, institutions and service organisations. Their roles and responsibilities in food production, marketing, storage and distribution are listed in Table 32. These institutions and organisations were categorised as follows:

1. Government: Agriculture, Forestry, Ministry of Health, Local government (municipalities with their Public Health departments), National Aquaculture Research and Development Centre;
2. Civil Society: Kitwe District Land Alliance (KDLA), National Traders and Marketeers Association of Zambia (NATMAZ), World Vision Zambia, Sustainable Agriculture Programme (SAP), Zambia National Farmers Union;
3. University: Copperbelt University;
4. Quasi-government: Zambia Environmental Management Agency; water and sewerage companies.

Table 32:

Key stakeholders and their roles, responsibilities and collaborative framework in the core and peripheral regions. (Source: this assessment, in-depth assessment phase).

STAKEHOLDER	ROLE IN FOOD PRODUCTION, MARKETING, STORAGE AND DISTRIBUTION	RESPONSIBILITIES/ OBLIGATIONS	COLLABORATORS
Ministry of Agriculture	National policy & legislation formulation; technical service provider; assessment of production.	Farmer support.	Rural & urban producers, crop marketeers, financial & training institutions, other government departments, civil society organisations, international organisations.
Kitwe City Council (KCC)	Local development & social policy & legislation formulation; management of the city; logistics; markets establishment & management; wholesale & retail business management; issuance of manufacturing & trading licences.	Provision of a conducive city service, infrastructure & environment for the healthy & secure production, movement, marketing, storage & consumption of foodstuff.	Local community organisations, civil society, national government, private sector, farmers unions, marketeers, farmers, food distributors, wholesalers & retailers, financial & training institutions.
Forestry (District & Research Offices)	National policy & legislation formulation; technical service provider; issuance of licenses to collect non-timber forest products; analysis of soil.	Ensuring that food production & the conservation of the environment exist in harmony.	Government, civil society organisations, private sector, financial & training institutions, local communities, traditional leadership.
National Agricultural Research & Development Centre (NARDC)	Provision of and research in the production of quality fingerlings & table-size fish.	Provide aquaculture support & facilities to fish farmers.	Zambia Agriculture Research Institute, National Science & Technology Centre, Kalimba Farms
Sustainable Agriculture Programme (SAP)	Provision of agriculture extension to smallholder farmers; input support on various crops; market linkages with government & private sector; capacity building to contribute to smallholder farmers' enhancement of knowledge	Coordinate programme; linkages with other stakeholders.	Kitwe District Land Alliance (KDLA), Zambia National Farmers Union, Ministry of Agriculture, Community Development, private sector.
World Vision Zambia	Production: community mobilisation into producer groups (PGs); linkages of PGs to technical services to enhance improved production & productivity; on-farm & off-farm natural resources management to enhance resilience to production shocks. Marketing/distribution.	Facilitation of community mobilisation into production structure; linkage for market access; provision of value chain financing; advocacy for a safer food system.	
Kitwe District Land Alliance	Advocacy related to issues of land policy, legislation, ownership and conflict.	Sustainability of food.	SAP, DEGHA, ASAYI, CARITAS, members of the local community.
National Traders and Marketeers Association (NATMAZ)	Represents rights and freedoms of marketeers and traders in Zambia.	Ensures the safe storage of food.	

Table 32: Continued

STAKE-HOLDER	ROLE IN FOOD PRODUCTION, MARKE-TING, STORAGE AND DISTRIBUTION	RESPONSIBILITIES/ OBLIGATIONS	COLLABORATORS
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; ensure that farmers do not sell all their produce but store part of the produce to prevent hunger; ensure farmers access to markets while at the farm, using a facility on mobile phones allowing the farmer to select the best market.	Represent the interest of farmers to government; provide financial loans to farmers working in colla-boration with ZANACO and NATSAVE banks.	ZANACO bank, NATSAVE bank and companies producing and retailing farm inputs, such as Saro and Camco.
Zambia Environmental Management Agency	Control of pollution to the environment; management of EIAs; monitors waste management.	Ensures developments are compliant with environmental impact regulations.	All organisations and institutions involved in development, including agriculture production.

5.9.2 National development framework context

Zambia has a population of about 13 million[4] and an estimated land area of about 750 000 square kilometres. The country's development framework strategies are anchored in the Vision 2030 (GRZ, 2006)[5] and Seventh National Development Plan 2017–2021 (7SNDP) (GRZ, 2017)[6].

Zambia is one of the world's poorest countries, with more than 50 percent of the population living in extreme poverty, while 67 percent of the rural population lives in extreme poverty (UNDP, 2011)[7].

Some of the strategies in the R-SNDP[8] have been formulated based on the following facts:

1. 51 percent of Zambia's population lives in extreme poverty; 67 percent of extremely poor people live in rural areas with agriculture identified as a strategy to improve food security and household incomes;
2. Economic growth is driven by capital-intensive sectors, such as mining, but has limited impact on community welfare; agriculture, which is labour intensive, has the potential to improve rural community welfare;
3. Inflation rates are high, above 7 percent. Current estimates of the annual rate of inflation (CPI) is 19.5 percent, annual food inflation rate is 23.4 percent and annual non-food inflation rate is 15.5 percent (CSO, 2015)[9]. Food and non-alcoholic beverages have contributed an average of 5 per cent between January to November 2015.

4 ibid. (CSO, 2011)
5 GRZ, 2006. Vision 2030. Government of the Republic of Zambia, Lusaka
6 GRZ, 2017. Seventh National Development Plan 2017–2021. Ministry of Finance. Government of the Republic of Zambia, Lusaka.
7 UNDP, 2011. Zambia Human Development Report 2011. UNDP, Lusaka.
8 Revised. Sixth National Development Plan
9 CSO, 2015. The Monthly. November 2015, Lusaka.

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, reflected in the Poverty Reduction Strategy adopted in May 2002, and also in the R-SNDP. In attempting to arrest and reverse economic decline, the Government implemented a sweeping programme of liberalisation and deregulation in the 1990s, eliminating most major market distortions. However, commitment to reform weakened in the mid- to late-1990s when macroeconomic stabilisation led to an initial contraction (ibid.)[20]

Agriculture has been prioritised as the most important sector. The R-SNDP 2013–2016 indicates that more than 50 percent of Zambia's population is employed in the agriculture sector; 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 that 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, to maximise the comparative advantage of different areas of the country and to access production and market information.
3. Poor storage, inadequate irrigation and other infrastructure challenges that have resulted in post-harvest wastages and over-reliance on rain-fed agriculture.

The Zambian Government's stated aims are to:

1. Promote and enhance crop diversification from maize to other crops, such as soya beans, wheat, rice, cashew nuts, beans, cotton, groundnuts, coffee, tea, oil crops and tubers.
2. Increase the area under irrigation; increase the 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.
3. Increase livestock numbers through the establishment of livestock breeding centres, the promotion of artificial insemination, the construction of dams and canals to support agriculture production and the establishment of milk collection centres.
4. Develop and rehabilitate infrastructure; enhance livestock disease control including compulsory dipping, surveillance and research; develop livestock standards and grades; and promote processing of livestock and livestock products.
5. Develop smallholder aquaculture and improve infrastructure for fisheries research and marketing.
6. Promote co-management of capture fisheries in natural water bodies to ensure sustainability of fisheries resources.
7. Improve access to finance, especially in rural areas, and promote guaranteed security on land tenure as collateral for small-scale farmers to access finance for productive assets, technology and other inputs.

5.9.3 Agriculture policy and legislation

The National Agricultural Policy 2004–2015 addresses issues of sectoral strategies, such as markets and private sector investments; agricultural production and utilisation; provision of agricultural services; accessibility of land for agriculture and development of

20 ibid. (UNDP, 2011)

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. See Table 33 for more detail on national agriculture sub-sector objectives and strategies.

The specific objectives of the policy are to:

1. Ensure national and household food security through year-round production and postharvest management of adequate supplies of basic foodstuffs at competitive costs.
2. Contribute to sustainable industrial development by providing locally produced agro-based raw materials.
3. Increase agricultural exports, thereby enhancing the sector's contribution to the national balance of payments.
4. Generate income and employment through increased agriculture production and productivity.
5. Ensure that the existing agricultural resource base is maintained and improved upon.

See Table 32 for the major stakeholders and their roles in food production, marketing, storage and distribution, which links to objectives and strategies in Table 33.

Table 33:

National agriculture sub-sector objectives and strategies (Source: this assessment, in-depth assessment phase).

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 utilisation.
	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 & Mechanisation		Contribute to increased agricultural production through the sustained use of appropriate farm 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.

Table 33: Continued

SUB-SECTOR	MAIN SECTION OF SUB-SECTOR	OVERALL OBJECTIVE
Fisheries		Increase fish production and promote sustainable utilisation of fisheries resources, thereby contributing to the economy through the generation of employment, income and improved availability of fish.
Agricultural Cooperatives Development		Create an enabling institutional and legal environment for the development of autonomous, transparent, viable and demand-driven cooperatives and other farmer organisations that will contribute to poverty reduction.
Agricultural Marketing and Credit	Agricultural Marketing	Promote development of a competitive, efficient and transparent marketing system for agricultural commodities and inputs, driven by public and private sectors.
	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 Cooperatives Training		Ensure that a critical mass of suitable and adequately trained manpower is produced in order to meet the needs of both the public and private sectors in a liberalised agricultural sector.

5.9.4 Environment and natural resources policies and legal framework

The environment and natural resources sector is governed by the legislation and agriculture-related provisions listed in Table 34. Other policies relevant to agriculture and natural resources management are: the National Adaptation Programme of Action (NAPA) of 2007; the Zambia Development Agency Act of 2006; the Mines and Minerals Development Act of 2008; the National Environmental Action Plan of 1994; the National Agricultural Policy of 2005; the National Biodiversity Strategy and Action Plan of 1999; and the Zambia National Action Plan for Combating Desertification of 2002.

Table 34: Key environment and natural resources policies and legislative framework provisions related to agriculture (Source: this assessment, in-depth assessment phase).

POLICY & LEGISLATION	PROVISIONS WITH A POTENTIAL IMPACT ON AGRICULTURE	INSTITUTION
Environmental Management Act No. 12 of 2011	Environmental assessments of the impact of policies, plans & programmes on the environment; prevention & control of pollution & environmental degradation; environmental audit and monitoring.	Zambian Environmental Management Agency
Fisheries Policy of 2015 (Draft); Fisheries Amendment Act No. 22 of 2007	Prohibition of aquaculture without a licence; restriction on use of chemicals in aquaculture; declaration of fisheries management areas.	Department of Fisheries
Forest Policy of 2015 and Forest Act of 2015	Establishment of protected forests, joint forest management areas & community forests; conservation & use of forest ecosystems & biodiversity; implementation of international environmental conventions and agreements.	Forestry Department

Table 34: Continued

POLICY & LEGISLATION	PROVISIONS WITH A POTENTIAL IMPACT ON AGRICULTURE	INSTITUTION
National Policy on Environment of 2007	Promote management of 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 the environment.	Department Environment & Natural Resources
Policy for National Parks and Wildlife in Zambia of 1998 and Zambia Wildlife Act of 1998	Conservation of: watersheds; historical areas of scenic qualities; unusual contrasts in landforms or vegetation; spectacular views and special landscape features; sites of invaluable ecological or geological benchmarks; water and soil resources critical to maintaining ecological integrity.	Department of Parks and Wildlife
National Energy Policy of 2008	Sustainable management of woodlands and forests; encourage utilisation of agro, forest and sawmill residues for combustion and gasification.	Energy Regulation Board

5.9.5 Other policies and legal frameworks that impact on agriculture

Several other pieces of legislation have a bearing on agriculture and food, such as:

i. Biotechnology and Biosafety Policy of 2003; Biosafety Act of 2007;
ii. National Climate Change Policy of 2016;
iii. Mines and Minerals Act of 2015;
iv. Urban and Regional Planning Act of 2015;
v. Public Health Act, Cap. 295;
vi. National Food and Nutrition Commission Act, Cap. 308.

These policies and pieces of legislation deal with food safety, markets and trading places, food consumption and nutrition as well as the impact of climate change on agriculture production.

5.9.6 Land policy and legal framework: tenure

The land sector in Zambia does not have a written policy statement as other sectors do. 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[21] with 94 percent of the country's land under customary tenure (Mudenda, 2006)[22]. 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 tenure. In order to avoid or resolve conflicts over land ownership, the legislation established the Lands Tribunal.

21 FAO notes on land tenure systems (customary land rights, 3.12) http://www.fao.org/docrep/005/y4307e/y4307e05.htm
22 Mudenda, M.M. 2006. The challenges of customary land tenure in Zambia. Shaping the Change. XXIII FIG Congress. Munich, Germany, October 8–13, 2006.

Land under customary tenure does not 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, Mudenda (2006) argue that the lack of legal title in customary lands brings about tenure insecurity as the 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, the following conflicts have arisen (ibid.)[23]:

1. Conficts between customary and private rights holders;
2. Conflicts in land allocation. Large tracts of land are allocated for conversion to private ownership, resulting in loss of access to resources for the poor;
3. Land boundary conflicts among traditional authorities.

Individual access to land under customary tenure has provided a basis for benefits from agriculture production.

5.9.7 City by-laws[24] and urban agriculture

City by-laws enshrined in the Local Government Act, Chapter 480, Section 110, affirms councils' 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 practise urban agriculture around the city. There is a 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, utilises 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 urbanisation, population growth, taxation (market levies) and 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 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 this 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 with support from the RUAF Foundation. The fact that policies and legislation are sector-based affects the institutional framework and how management systems are structured

23 ibid. (Mudenda, 2006)

24 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.

and monitored. There is therefore a need to harmonise policies on agriculture and other land uses including land tenure.

5.9.8 The governance role of vertical and horizontal linkages in the target value chains

The benefits of vertical linkages in the target value chains

Vertical linkages constitute the relationships between actors along the value chain. Effective vertical linkages play an important role in supporting the upgrading capacity of the chain. For instance, actors in the value chains for fresh tomatoes, onions, rape, cabbages, bananas and mangoes must be able to respond quickly to changing food safety and quality standards. Rapid response to changing market conditions requires on-going communication and cooperation both up and down the chain. When actors that are vertically linked are willing and able to share information on new products and technologies, then the value chain as a whole is more competitive because it can adapt more rapidly to changing market conditions.

Effective vertical linkages can contribute to value chain competitiveness in other ways by creating conditions that support investment. For instance, producers can receive credit from the buyers for capital improvement which can help them overcome cash-flow constraints. They can also receive services from other actors along the chain, such as training, technical assistance, skills transfer and assistance with long-term investment for irrigation equipment or post-harvest handling facilities. Such actions often assure other actors along the chain (e.g. buyers) about the quality of products from producers who receive such assistance. Thus, effective vertical linkages benefit the entire value chain by improving product quality and productivity. It is worth noting that the nature of vertical linkages – including the volume and quality of information and services disseminated – often defines and determines the benefit distribution along the chain and creates incentives for, or constraints to, upgrading or value addition. Consequently, when vertical relationships are characterised by mistrust, misinformation and opportunistic behaviour, the entire value chain may struggle to remain competitive.

According to M4P (2008) vertical linkages between actors can be mapped into three categories:

1. Spot market relations: these are relationships that are created 'on the spot'. Actors make a transaction (including negotiations on price, volume and other requirements) with the duration and scope of that specific transaction.
2. Persistent network relations: these occur when actors prefer to transact with each other time and again. It comes with a higher level of trust and some level of interdependence. The relationship can be formalised by contracts, but these are not a necessity.
3. Vertical integration: this involves relationships where actors share the same (legal) ownership. One and the same organisation deals with different processes throughout the chain.

Vertical linkages in the Kitwe CRFS

Vertical linkages in the value chains of beef, chickens, eggs, milk, rape, cabbages, onions, fish, tomatoes, mangoes and bananas mostly take the form of spot market relations, particularly for small-scale producers, processors and traders (the target for this study). Persistent network relations do exist in these value chains although they are not as strong and widespread as spot market relations. This is, in part, due to mistrust among actors whose relationships are often characterised by misinformation and opportunistic behaviour. Overall, integration is limited among actors who operate on a small-scale basis but is prevalent among largescale actors, particularly in the chicken,

egg and beef value chains. These large-scale actors (e.g. ZAMBEEF and Golden Lay) deal with different processes throughout the chain and so increase their competitiveness.

The benefits of horizontal linkages in the target value chains

Horizontal linkages constitute the relationships between actors on the same level of the value chain. They interact to accomplish what a single actor working independently could not do so well. By pooling skilled manpower, horizontally linked actors are able to minimise transaction costs, access market information and adhere to government regulations more easily (Mutura *et al.*, 2016). The linkages promote economies of scale, improve product quality and create opportunities for accessing value additions. They also improve access to support services and strengthen collective action on securing new markets and on bargaining for better prices for products.

Effective horizontal linkages can promote efficiencies, open up markets and spur beneficial competition. The producers' association is a typical example of a horizontal relationship designed to promote economies ofì scale, favorable market pricing and other benefits for members. Cooperation enables actors to gain access toì new buyers and better prices through group marketing. Collectively operating actors, particularly those whoì operate on a small scale, can become more attractive commercial partners to large-scale buyers because theì transaction costs are less than if they dealt individually with many small firms.

Horizontal linkages in Kitwe CRFS

In the Kitwe CRFS, horizontal linkages are more common among producers than among actors at other levelsì of the value chains. Furthermore, such linkages are more evident among producers of a few of the targetì products for this value chain study. These include rape, cabbages, onions, tomatoes and milk. In the rape,ì cabbage, tomato and onion value chains, horizontal linkages are fostered by production groups orì cooperatives that facilitate collective input procurement (mostly fertiliser). Such collective actions can lowerì the costs of inputs for individual producers (i.e. farmers), contribute to shared skills and resources, enhanceì product quality through common production standards and increase the potential for upgrading andì innovation. However, such beneficial relationships are limited and, in some cases, are absent among theì producers. This is, in part, because these actors' relationships are often characterised by mistrust and misinformation.

Horizontal linkages in the milk value chain enable producers to form cooperatives so they can deliver their milk to collection centres and sell it collectively to large-scale processors (e.g. Pamalat). This process reduces transaction costs and can facilitate collective bargaining for better prices of milk. However, for the most part, prices are regulated by the buyers (i.e. the processors) and are determined using complex formulas based on bacterial count and butterfat content of the milk among others. As a ressult, the aforementioned benefits are often restricted and, in some cases, absent. It is also worth noting that since payment for the milk is often not made until the end of the month, milk cooperatives at the collection centres face competition from other marketing channels, such as the informal small-scale vendors whose model of payment is more favourable than theirs.

6. Land Use and Cover Changes in the City Region (1989–2016)

6.1 Factors affecting land use changes

6.1.1 The significance of land use change

Land is one of three major factors of production in classical economics (along with labour and capital) and an essential input for housing and food production. Thus, land use is the backbone of agricultural economies and it provides substantial economic and social benefits. Land use change is necessary and essential for economic development and social progress. Land use change is also called land use transformation and denotes the man-made process of changing the land use from one type to another, e.g. transformation of forest area to an agricultural crop or transformation from pasture land to a residential area. Land use changes may be followed by distinct or drastic changes in the land quality, such as decreases in biodiversity, increased soil compaction and loss of nutrients. These quality losses constitute the ecological damage from land use changes. If the original land use type is a scarce or endangered biotype then the damage from land use change is greater than if it is a common land use type. There are, however, possible land use changes that constitute an ecological gain, e.g. if built-up land is transformed to gardens, although this rarely happens in the city region. Land use change, however, does not come without costs. Conversion of farmland and forests to urban development, as so often happens in the Kitwe city region, reduces the amount of land available for food and timber production. Soil erosion, salinisation, desertification and other soil degradations associated with intensive agriculture and deforestation reduce the quality of land resources and future agricultural productivity (Lubowski *et al.*, 2006).

6.1.2 Challenges for farming on the urban fringe

Urbanisation presents many challenges for farmers on the urban fringe of the city region. Conflicts with nonfarm neighbours and vandalism, such as destruction of crops and damage to farm equipment, are major concerns for farmers at the urban fringe (Lisansky, 1986). Neighbouring farmers often cooperate in production activities, including equipment sharing, land renting, custom work and irrigation system development. These benefits disappear when neighbouring farms are lost to major mining and infrastructure development (i.e. the new international airport in Ndola). Farmers may no longer be able to benefit from information sharing and formal and informal business relationships among neighbouring farms. Urbanisation may also cause the 'impermanence syndrome' (i.e. a lack of confidence in the stability and long-term profitability of farming), leading to a reduction in investment in new technology or machinery, or the idling of farmland (Lopez *et al.*, 1988).

6.1.3 Land use systems in Kitwe District

This study shows that the main land use systems in Kitwe District can be categorised as mining, forestry, agricultural production, fisheries, manufacturing and industry and urban (including human) settlements. The five major land-based ecosystem services – namely, mining, forestry, agriculture production, manufacturing and industry – are identified as having significant contribution to the livelihoods of both the local and surrounding communities of Kitwe District.

6.1.4 Growth and impact of the copper industry

A study conducted by Limpitlaw (2001) over a 40-year investigation period found that the zone of deforestation around Kitwe has increased dramatically and has merged with that of neighbouring Mufulira. Natural land cover near the Copperbelt Cities has largely been converted into sparsely vegetated (high reflectance) agricultural areas. With the high intensity rainfall events common here and the poor nutrient levels in the lateritic soils, permanent land degradation is likely. The study also noted that, within Kitwe, most mining-related land uses increased significantly during the 1970s and early 80s, which were the boom years for the copper industry. Recent trends have shown new mining and industrial developments occurring along the major highway connecting cities within the city region. Since the decline of world commodity prices, mining infrastructure has ceased growing in area. The same trend occurs in urban areas.

The same study also found that population growth has not stabilised, as seen in the increasing extent of informal settlements. With little funding available for urban development and service provision, increasing numbers of people live without sanitation or access to clean water. This, combined with the presence of mine pollution, has led to an unacceptable negative impact on the community.

The points above are proven in the land cover changes observed in this study for the core and peripheral regions for the city region between 1989 and 2016. Built-up areas and bare land increased by 8.67 percent (Table 35 and Figure 25) in the same span. This is in contrast to the 1.16 percent decline in the area under agriculture and forests. The 8.67 percent increase in built-up and bare land without doubt shows an increase in urban activities that include conversion of land under agriculture and forests to urban settlements and infrastructure development.

Table 35:

Land use/ cover changes in the core and peripheral regions between 1989 and 2016 (Source: this assessment, in-depth assessment phase).

LAND USE TYPE	AREA 1989 (000 HA)	AREA 2016 (000 HA)	DIFFERENCE	% CHANGE
Agriculture and forests	1 714	1 694	-19.9	-1.16%
Built-up areas & bare land	225	245	19.5	8.67%

6.2 Socio-economic impacts of land use changes

In general, changes in land use lead to the following types of socio-economic impact:

- Conversion of farmland and forests to urban development reduces the amount of land available for food and timber production;
- Soil erosion, salinisation, desertification and other soil degradations associated with agricultural production and deforestation reduce land quality and agricultural productivity;
- Conversion of farmland and forests to urban development reduces the amount of open space and environmental amenities for local residents;

- Urban development reduces the 'critical mass' of farmland necessary for the economic survival of local agricultural economies;
- Urban development patterns not only affect the lives of individuals, but also the ways in which society is organised;
- Urban development has encroached upon some rural communities to such an extent that the community's identity has been lost;
- Suburbanisation intensifies income segregation and economic disparities among communities;
- Excessive land use control may hinder the function of market forces;
- Land use regulations aimed at curbing land development will raise house prices, making housing less affordable to middle- and low-income households;
- Land use regulation must strike a balance between private property rights and the public interest.

In the Kitwe CRFS, evidence of socio-ecomonic impacts of land use change can be seen in the maps in Figure 25, showing some dramatic changes between 1989 and 2016, particularly in the core and peripheral regions.

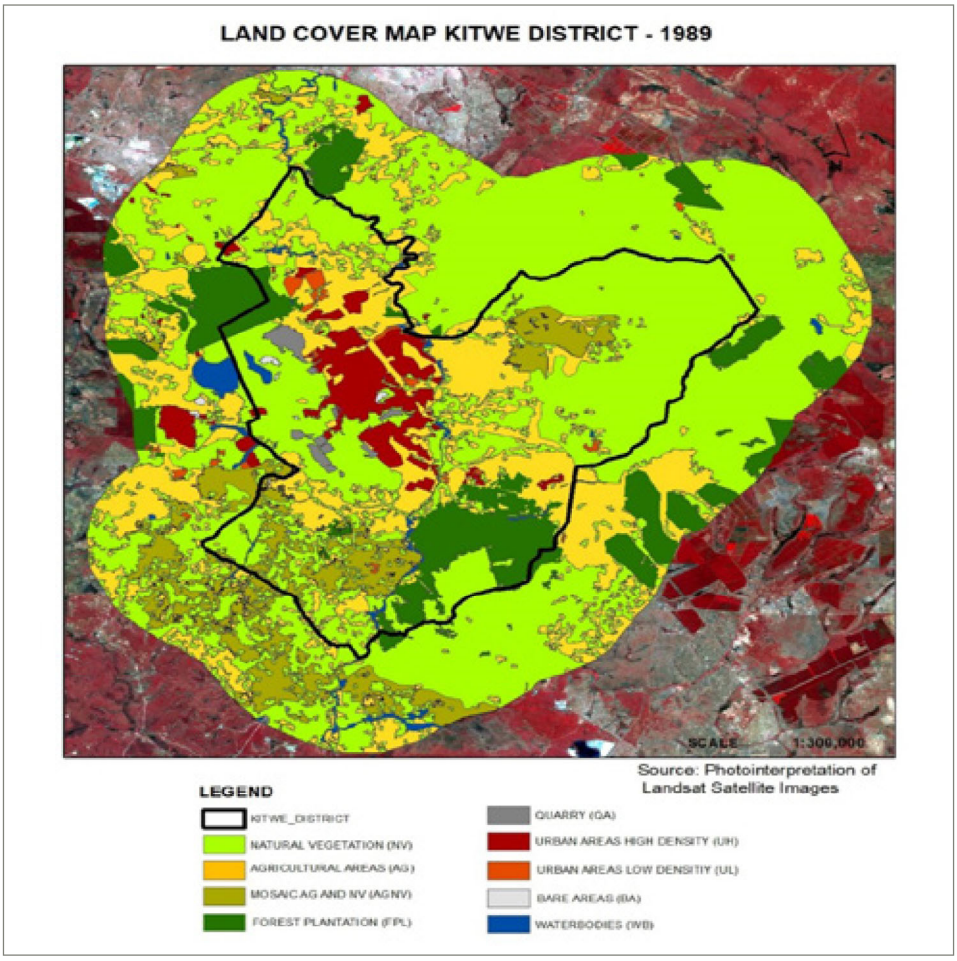
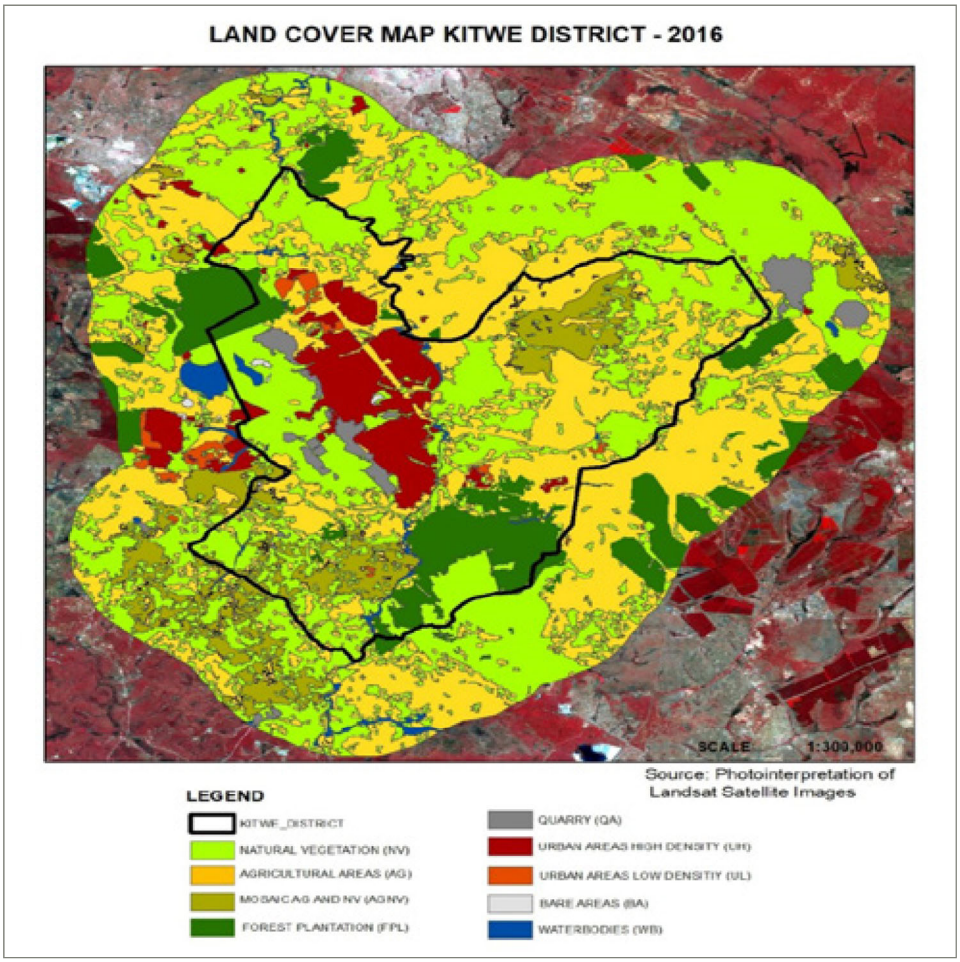


Figure 25a:

Land use/cover changes between 1989 and 2016 within the core and peripheral regions.

Figure 25b:

Land use/cover changes between 1989 and 2016 within the core and peripheral regions.



6.3 Environmental impacts of land use changes

6.3.1 Types of impact

Changes in land use lead to the following types of environmental impact:

- Land use and land management practices have a major impact on natural resources, including water, soil, air, nutrients, plants and animals;
- Run-off from agriculture is a leading source of water pollution both in inland and coastal waters;
- Draining wetlands for crop production and irrigation water diversions has had a negative impact on many wildlife species;
- Irrigated agriculture has changed the water cycle and caused groundwater levels to decline in many parts of the world;
- Intensive farming and deforestation may cause soil erosion, salinisation, desertification and other soil degradations;
- Deforestation adds to the greenhouse effect, destroys habitats that support biodiversity, affects the hydrological cycle and increases soil erosion, run-off, flooding and landslides;

- Urban development causes air pollution, water pollution and urban run-off and flooding;
- Habitat destruction, fragmentation and alteration associated with urban development are leading causes of biodiversity decline and species extinctions;
- Urban development and intensive agriculture in coastal areas and further inland is a major threat to the health, productivity and biodiversity of the marine environment throughout the world.

6.3.2 Kitwe city region and environmental impacts

The city of Kitwe is known as the commercial hub of the Copperbelt Province in Zambia and its economy has been dependent on the fortunes of the export-oriented copper mining industry. Mining companies are major land owners in Kitwe District, as is the case for the whole Copperbelt Province, under special leasehold agreement with the government. Approximately 25 percent of the land in the district is under the Nkana Mining Licence Area number 3, on which the mining operations of Mopani Copper Mines (MCM) and Konkola Copper Mines under licence number 38 are undertaken.

Some environmental effects of this kind of land use include water and air pollution, mainly from the copper mines, illegal sand mining and environmental disasters such as flooding and deforestation on the urban fringe. Deforestation is associated with mining-related urban development that has led to increasing charcoal and food consumption. The main types of mine waste produced in the Copperbelt Province comprise overburden, waste rock, tailings and slag. Overburden comprises near surface soils and rock from open-pit stripping operations and is normally stockpiled above ground close to the open-cast mine and used in pit backfilling. Waste rock is generated in underground shaft mining and is stockpiled above ground close to the open-cast or underground mine. Tailings are waste materials produced from the concentration of metals and are generated annually large quantities. Tailings are transported as slurry in pipes to a disposal site called a tailings dam.

The impact of mining on soils comes from the large quantities of mining slag and silt deposited on fertile soils that could alternatively be used for agriculture. Both liquid and solid waste deposit large quantities of heavy metals into the water system that, in turn, impacts on the aquatic fauna and flora, significantly affecting aquatic sources of food.

Intensive farming, particularly in ecologically sensitive ecosystems, and deforestation may cause soil erosion, salinisation, desertification and other soil degradations. Irrigated agriculture, especially on riverbanks and wetlands, has caused soil erosion and led groundwater levels to decline in some rural areas. Such irrigation work has included the construction of ridges in wetlands for crop production and water diversions. However, some wetland cultivation by small producers who cannot afford irrigation facilities does produce significant quantities of vegetables and maize, particularly during the dry season.

Deforestation and forest degradation arises from agriculture extensification into forests, charcoal and wood fuel production, and urban settlements. These add to increased emissions of greenhouse gases, destroy or alter habitats that support biodiversity, affect the hydrological cycle, especially when it involves catchment forests, and increases soil erosion, run-off and flooding. Urban developments, particularly unplanned settlements that occur even in areas reserved for conservation, results in habitat destruction, fragmentation and alteration that negatively impact on biodiversity.

In the Kitwe CRFS, land use changes are largely influenced by poor governance in terms of failure to adhere to – and enforce – town planning regulations, national conservation policies and the role that partisan politics plays out relative to existing policies and laws.

7. Policy and Planning Interventions for Strengthening the CRFS

This section focuses on current challenges and recommended interventions (addressing policy gaps and developing strategies) in the food and agriculture sector. These challenges and interventions were identified by the stakeholder working groups and have implications for policies governing agriculture, including the way that agriculture and related sectors are managed. The working groups used scenarios in relation to specific opportunities to explore the potential impacts of changes in direction or of new programmes. (Outputs from the four working groups are in Appendix 7.)

7.1 Agriculture production

7.1.1 Inadequate technical agriculture services

Extension services in the city region are not adequately spread out among farmers, particularly affecting small-scale producers who cannot afford technical services. The problem has two faces: fewer extension agents to attend to all farmers and the geographic spread of the farming community.

Rationale for intervention

i. Too few extension officers (currently a farmer–officer ratio of 400 to 1): there are currently not enough extension personnel to cover all the farmers, particularly small-scale producers. This affects agricultural production as small producers are not able to receive technical assistance in terms of input supply sources, production technologies, integrated pest management strategies and markets for their produce.

ii. No private sector-driven extension service delivery: even though large-scale producers can 'contract' extension services, Zambia has not opened up to private extension services. The only limited services available are from seed suppliers primarily related to the use of their own seed supply.

iii. Low capacity-building services for extension officers: continuous upskilling of extension personnel rarely occurs in the city region and this hinders the continuous development and application of new technologies.

iv. Lack of improved mobility of extension officers: extension personnel have no or inadequate access to transportation that can facilitate their access to farmers. This limits their effectiveness and levels of contact with producers.

Policy gaps

i. Policy to increase access to private technical services: in order to free government-funded extension services to focus on resource-poor producers, mechanisms are required to enable increased access to private extension services by large-scale producers.

ii. Fiscal policy (taxation): fiscal policy gaps are preventing adequate technical support and incentives to farmers to implement climate smart practices. Policy change is needed to unlock national funding and increased access to technical support that will enable the country's food producers to find ways to adapt to, and mitigate for, climate change impacts.

Strategies

i. Facilitation of the participation of private sector entities through the revision of policies and legislation governing the provision of technical services to farmers. This can be anchored under 7NDP Strategy 2 (7.4.2) part (d) *Business development services provision.*

ii. Increased financing of agriculture extension services as either part of the subsidy, FISP, or as part of reforms to fiscal policies. The 7th NDP provides a window where this can be anchored on Strategy 1 (7.4.1) in terms of *improve production and productivity* particularly under programme (b) *Farm block development.*

iii. Increase numbers of extension personnel per farm block in order to provide technical services to farmers. This can be anchored on the same strategy as in (ii) above.

7.1.2 Poor agricultural infrastructure and mechanisation

The city region is not well serviced by all-weather road infrastructure and not all areas are accessible. Other forms of infrastructure that are deficient include product storage facilities, irrigation equipment and processing equipment.

Rationale for intervention

i. Poor roads: production areas are serviced by fewer and non-permanent feeder roads that require improvement to facilitate the movement of inputs, product outflows and traders all year round.

ii. Poor storage facilities: farming areas and markets lack bulk storage facilities such as cold storage sheds and silos. This deficiency is partly to blame for the food wastage observed at the farmgate and in major markets where agriculture commodities are traded.

iii. Lack of equipment and machinery: promoting access to farm machinery via public–private partnerships for resource-poor smallholders and farmers has the potential to contribute to increased production. This could be facilitated by provision of incentives to private actors to invest in machinery hire services or hire purchase at low costs for small-scale producers.

iv. Absence of cooperation: promotion of communal or group ownership of machinery through cooperatives or other mechanisms would allow small-scale producers to pool resources and enable access to expensive machinery, otherwise unaffordable to individual producers.

7.1.3 Dis-harmonisation of stakeholders' approaches to land tenure

Access to, and ownership of, farming land by many small-scale producers is a challenge, particularly for those living within, or peripheral to, the city. Additionally, the absence of inter-sector land use planning affects both land use and related conflicts.

Rationale for intervention

i. Promote efficient use of land, access to and ownership of land: small-scale producers have struggled to access resources that would improve their use of land, such as tractors or production-enhancing technologies. Improving access to, and ownership of, land would also provide them with the security they need to invest in remaining on their land.

ii. Minimise uncontrolled extensification of agriculture into forests and ecologically sensitive areas: there are currently few control measures for unregulated extensification, primarily in customary land and, to a lesser degree, in protected forests. There is some control of the spread of agriculture in relation to protected

forests, but not in relation to customary land. Customary land is under traditional and not state jurisdiction. Therefore, the controls (restrictions) that govern protected forests are absent in the case of customary land. (Reference to customary land includes all natural resources in this land category.)

iii. Reduce land conflicts: there have been land conflicts in relation to open spaces reserved for urban development and restrictions related to urban farming. There are also conflicts between producers and forest authorities, and between producers and wildlife authorities, over access to land in these areas.

Policy gaps

There is presently no land policy to create policy harmony in the context of land use, access and tenure. Development of a land policy for Zambia is fundamental to facilitating access to land and tenure.

Strategies

Strategies that could contribute to finding a resolution include hastening the decentralisation process of the ministry responsible for land and the creation of cheaper, more web-based, accessible digital maps (thereby cutting print costs and reducing maintenance and storage costs). Zambia has a decentralisation policy related to institutions and governance infrastructure that has not been fully implemented. Decentralisation accompanied by devolution of governance is likely to see the transfer of resources and jurisdiction authority over land-related matters, access and tenure to local governments. This would give local governments the power to plan how to allocate land, with limited central government control, and to resolve conflicts locally, helping to facilitate improved access and/or tenure for the farmer.

7.1.4 Use of unsafe water in agriculture and agro-commodities

Agriculture uses a large proportion of water for irrigation and for cleaning the agro-commodities destined for human consumption. The water needs to be clean and safe for both irrigation – for example, of vegetables –and cleaning horticultural products, such fruit and tomatoes.

Rationale for intervention

i. There are currently inadequate information-sharing platforms among urban farmers who commonly use unsafe water in agriculture. This absence contributes to lack of awareness among urban producers with respect to safe water use.

ii. Lack of awareness about the requirements of existing health regulations among small-scale urban producers.

iii. Local and national agriculture, environmental and health services have not been effective in the enforcement of existing health and environmental legislation.

Policy gaps

There are no known gaps in related policies. However, there are institutional failures in ensuring that producers comply with environmental regulations governing the use of safe water.

Strategies

i. Establishment of community-based knowledge-sharing platforms among small-scale producer communities and residential areas where urban agriculture is practised and where the use of unsafe water is common.

ii. Create awareness in civil society about the importance of using safe water in food production and preparation.

iii. Improve the capacity of ZEMA and municipal authorities to enforce health and environmental regulations, and become more effective in reducing the use of unsafe water in agriculture.

7.2 Agro-processing, distribution and marketing

7.2.1 Lack of processing capacity

The city region has significant challenges in processing or adding value to locally produced agro-commodities. The challenge relates to significant quantities of seasonally produced mushrooms, vegetables and fruit, such as mangoes, guavas, bananas, mulberries, papayas and a large number of wild fruits, such as *Uapaca kirkiana.* A significant proportion of these fruits (particularly mangoes, guavas, papayas and some of the wild fruits) are lost. Exact quantities are not known, but casual estimates suggest that over 50 percent is wasted between collection and retail points. The losses are primarily due to inadequate (or the absence of) storage facilities at collection points and within the post-collection supply chain. The availability of dried mango slices and vegetables in supermarkets and markets respectively suggests there is a market even for semi-processed products. The establishment of processing facilities with low overheads at the small-scale producer level has the potential to ensure that the bulk of the commodities produced in the region are available for consumption. This would increase food security potential, improve household incomes and contribute significantly to tackling nutritional challenges that currently result in the high number of children under five who are stunted.

Rationale for interventions

i. High taxes and duties: included in the significant list of processing challenges are high taxes and duties for imported machinery for small-scale production. There are currently no attractive tax incentives for private-sector investments in processing commodities. The small-scale producer has poor access to technical services related to processing and thus supplies commodities with low value addition that attract a low market price.

ii. Lack of collaboration: there are no stakeholder forums for the agro-processing sector that engage and involve small producers, the private sector, civil society, government and research institutions.

iii. Lack of awareness of best practice: awareness raising through film documentaries can showcase how waste is an issue locally and how others have successfully managed the waste internationally (e.g. an example of best practice within the region in which waste is processed into marketable products).

Policy gaps

Gaps identified so far in investment policies related to agro-processing are import duties/taxes and the lack of infrastructure investment incentives. Other related policy gaps are not known.

Strategies

i. Design and implement awareness -raising programmes to help stimulate improved practices and innovation, especially in relation to the reduction and re-use of waste.

ii. Establish stakeholder forums that engage and involve small producers, the private sector, civil society, government and research institutions in improved practice and innovation.

iii. Build capacity in low-technology and low-cost processing methods for drying and packaging commodities such as vegetables and fruit.

7.2.2 Lack of increased research in agro-processing and development

Research is fundamental to development and, in the context of agro-commodities, this entails applied research that adds value to the range of agro-products from the city region. Areas in which research is required include food transportation and distribution; processing, packaging and storage; consumption and nutrition; value addition; waste management and recycling; and linking research and policy.

Rationale for interventions

i. There is currently inadequate financing and other resources to support research in agro-processing and development by government or private research organisations.
ii. There is neither a dialogue nor a producer knowledge-sharing platform about agro-processing within the city region.

The related policy gaps and strategies are as above.

7.3 Value chain

7.3.1 Challenges in packaging, grading, labelling, commodity sorting and promoting linkages among value chain actors

Small-scale producers have no access to capacity building that targets packaging, grading, labelling and sorting of food commodities. These are, however, key elements in ensuring a fair price for agro-commodities in the markets of the city region. Additionally, these producers are not linked to other value chain actors. Knowledge-sharing platforms where small-scale producers interact and strengthen their relationships through existing producer and trader associations are also critical.

Rationale for intervention

i. Poor access to high-value markets.
ii. Small-scale producers have poor or no information on the importance of product packaging, grading, labelling and sorting, or to other actors in the value chain.
iii. Mistrust exists among value chain actors, particularly between the producers and the middlemen in marketplaces. Middlemen, who act as brokers between producers/suppliers and retailers, are instrumental in determining a low market price for the producer or supplier.

Policy gaps

The city region does not have policies that are targeted at addressing this challenge, particularly for smallscale producers. The existing general provisions for product quality and labelling only favour large-scale producers.

Strategies

i. Catalyse policy reforms to improve the capacities of small-scale producers; establish an institutional framework that promotes product packaging, grading, labelling and commodity sorting for small-scale producers.
ii. Establish knowledge-sharing platforms whereby small-scale producers interact and strengthen their relationships to help them with the challenges of adding value to agro-commodities.

7.3.2 Absence of long-term credit facilities for farmers

Promoting provision of tailor-made credit packages and capacity building to develop viable business plans are pipe dreams for most small- and medium-scale producers. Long-term credit facilities for farmers, where capital can be sourced, are primarily accessible to large-scale producers. Availability of capital is critical to the success of a farming business, especially for small- and medium-producers for whom resources are constrained.

Rationale for intervention

i. The agriculture sector has inadequate tailor-made credit facilities for small-scale producers who have no collateral. Low-cost credit facilities have the potential to increase production by facilitating access to inputs. The market for commodities such as maize is largely controlled by the Food Reserve Agency, which operates on a system where the farmer supplies the commodity and is paid at a later date. The payment date can, in some cases, be late in the farming season – thus denying the farmer the resources to invest in the procurement of inputs.

ii. Small-scale producers lack the ability/capacity to develop business plans that can be a requirement for accessing capital.

Policy gaps

There is currently inadequate policy provision for the following:

i. Non-collateral farm credit that favours small producers.

ii. Affordable insurance and favourable interest rates for farm credit.

iii. A farmers' credit provider supported by government with reduced taxes and interest rates as incentives for investment. Government could raise financing for this facility through the establishment of a *Farmers' Bond or Treasury Bill* on the bond market. Local facilities that do exist, such as the one provided by Madison Insurance's AgriFinance [http://www.mfinance.co.zm/index.php/services/agric-financing/] covers only poultry, piggery and dairy farming.

Strategies

Government, through the agriculture ministry, to implement the following strategies:

i. Provide fiscal policy and legislative mechanisms for farmer access to non-collateral farm loans and/or Insured Credits.

ii. Promote Pass-on-the-Gift schemes, secured by government, such the one under Heifer International. In this scheme, a producer can be provided with a female animal from which an offspring is passed to the next producer.

iii. Promote Low-Input Farming, such as conservation agriculture and climate-smart agriculture, to minimise the high inputs associated with conventional agriculture.

7.4 Environment and natural resources degradation

7.4.1 Unsustainable natural resources management

Management of natural resources across agricultural landscapes poses a challenge, particularly the clearing of forests by small-scale farmers. Prior to farming, small-scale producers either directly or indirectly engaged in the felling of trees and the production of charcoal. In the northern part of Zambia, burning of wood that has been cut and

heaped precedes most farming practices in a system popularly called *Chitemene. Chitemene* is a form of fallow cultivation that has been practised for hundreds of years.

Rationale for intervention

i. Lack of awareness of the need to address integrated natural resources management by smallscale farmers. In addition, they have a limited capacity to do so. This has contributed to deforestation, forest degradation or poor soil husbandry;

ii. No access to tree seedlings, which are costly to procure.

Policy gaps and strategies for this section are similar to those for agriculture production.

7.4.2 Poor management of agrochemicals

Synthetic (inorganic) agrochemicals available to agro-producers include pesticides, herbicides, fertilisers and plant hormones. Some of these agrochemicals can be harmful to other organisms when they accumulate and reach high concentrations. Agrochemical use in agriculture has been associated with increases in crop yield, animal production and reduced post-harvest losses[25],[26]. Pesticide use, for example, has helped to prevent the loss of fruits, vegetables and cereals from pests. The main classes of pesticides are organochlorines, organophosphates and carbamates. Pesticide poisonings and deaths occur in developing countries due to inadequate safety standards and protective clothing, insufficient labelling, illiteracy and unawareness of the hazards of pesticides. Farm workers can therefore be at risk, especially when safety standards are not adhered to, as organophosphates, carbamates and organocholines can penetrate the skin.

Pesticide effects on the environment derive from point source and non-point source pollution. These arise from pesticide spills, leakages from a storage facility and the improper disposal of pesticides or the pesticide containers, as well as from the drift of pesticides in the air, run-offs and contamination of underground water sources. Both types of contamination have the potential to affect drinking water, wildlife habitats and food crops.

Rationale for intervention

i. There is currently inadequate capacity among small-scale farmers and input suppliers to implement Integrated Pest Management Control (IPMC) and agrochemical management.

ii. Inadequate information-sharing platforms among farmers have resulted in low awareness and limited access to information on IPMC and agrochemical management technologies.

iii. The small-scale agriculture sector has low uptake of, and technical services related to, sustainable or conservation agriculture.

Policy gaps

There are known gaps in policies related to agrochemical management. In addition, there are institutional failures in ensuring that pesticides are managed in an environmentally friendly way.

25 Wang'ombe, G.M. 2004. Risk of agrochemicals on the environment and human health – in Mukano location, Nyeri County, Kenya. Kenyatta University. Thesis. Unpublished. April 2014.

26 Bhandari, G. 2014. An overview of agrochemicals and their effects on environment in Nepal. Applied Ecology and Environmental Sciences. Vol. 2(2), 66–73. Available online at http://pubs.sciepub.com/aees/2/2/5 © Science and Education Publishing DOI:10.12691/aees-2-2-5

Strategies

Government and stakeholders in the agriculture sector to do the following:

i. Establish knowledge-sharing platforms where information on IPMC and management of agrochemicals can be transferred or acquired.
ii. Create awareness in civil society about the importance of farmers' good management of pesticide use and use of other agrochemicals, with the purpose of increasing public pressure for improved management.
iii. Improve the capacity to enforce environmental regulations in organisations tasked with environmental and natural resources management, such as ZEMA and municipal authorities.

7.5 Priorities for further in-depth research, analysis and action

Priorities for further research, analysis and action are tabulated in Table 36. They were identified in parallel with work on challenges and recommended interventions.

Table 36:

Priorities for in-depth research within the city region (Source: this assessment, policy support and planning phase).

FOOD AREA	THEME OR PRIORITY RESEARCH	IN-DEPTH RESEARCH & ANALYSIS
Agro-production	Estimation of production volumes of vegetables by small-scale producers	Develop/establish easy to apply estimation methods for agro-production of vegetables. Carry out a feasibility study for implementing non-collateral loan scheme for promising small-scale farmers.
Food processing, storage & distribution	Low-cost processing technologies	Develop/establish food processing technologies, such as drying, for fruit & vegetables. Provide technical support to establsih small-scale processing facilities.
	Low-cost storage facilities & technologies	Feasibility study to establish a profitable storage facility for fruit & vegetables in one main market per city. Provide technical support to municipality & traders/ retailers for establishing storage facilities.
	Agriculture & other waste-recycling facility	Feasibility study to establish a profitable recycling facility one per major city (Kitwe, Lusaka & Ndola). Provide technical support to municipality for establishing recycling facility.
Environment & natural resource management	Trade-offs	Understanding of social & environmental trade-offs in agriculture in order to promote sustainable & integrated land use.
Governance	Review of by-laws	Technical support to municipalities to develop food strategies & by-laws friendly to urban agriculture.
	Decentralisation and agriculture	Technical support to municipalities to develop an institutional framework to manage agriculture under decentralisation.
Value Chain	Access to long-term credit, irrigation equipment, extension services; inadequate infrastructure	Improve small-producer access to credit, irrigation technologies & services, technical services. Improve investments in agro-related infrastructure, including roads.

8. Lessons Learned

8.1 Stakeholder dialogue

8.1.1 A multi-disciplinary approach

The Kitwe CRFS assessment project established the Multi-stakeholder Task Team (MTT) as a platform for dialogue. The MTT was maintained and developed throughout the assessment process, engaging with its members and wider stakeholders as well as providing information and data. The multi-disciplinarity of the MTT was good for a cross-breed of knowledge and information.

8.1.2 Consistency

Maintaining the same individuals from stakeholder organisations is a good lesson as individual members bond and have an 'institutional memory' that is an asset to the process.

8.1.3 A mechanism for managing more in-depth working groups

The MTT was subdivided into four food areas: agriculture production; food process/distribution/catering and trade; food value chain; and environment and natural resource degradation. The working groups were then tasked to carry out an in-depth analysis of the challenges, strategies for resolving the challenges and action points related to each strategy for their respective food area. Additionally, the last working group meeting entailed the validation of the policy brief that covered all the food areas. Selected working group members participated in the process of presenting the policy brief to policy makers.

8.2 Data collection

8.2.1 Baseline data

This report has captured a lot of data in one place. With more time and resources it could be presented in different ways to enable further analysis. However, it provides crucial baseline data for any future food system development programmes, clarification of desired outcomes and use of metrics to assess progress or change.

8.2.2 Data gaps

There are key data gaps in food production – particularly for vegetables where quantifying production volumes is difficult. For the future: i) measures to develop methodologies to effect this are required; and ii) provision of support to the Central Statistical Office and Ministry of Agriculture for capturing this data is necessary.

9. Conclusions

1. Land tenure and access: most small-scale farmers, in both the core and peripheral regions, are still illegal settlers awaiting land entitlement. This is despite the core region having state land over which farmers are expected to enjoy security of tenure. The peripheral region has plenty of customary land that farmers utilize. However, security of tenure under customary land is quite compromised, as the land is in the hands of chiefs or, rather, traditional leaders. Access to land is very difficult in the core region due to high demand combined with competition between agriculture and urban development. Much of the peripheral region, however, has adequate land area for various agricultural undertakings. Women face difficulties with regard to ownership of land, despite being the most active in the agricultural production arena. Much of the farmland is owned by men and most of the women that own land do so in partnerships with their male spouses. According to the Gender and Land Rights Database (GLRD) of Food and Agricultural Organization (FAO), only 19.2 percent of the land in Zambia is owned by women as compared to 80.8 percent for their male counterparts.

2. Policies and legislation governing agriculture: these include the Agriculture Policy and Acts, Forest Act, Land Act, the Mines and Minerals Act, the Zambia Wildlife Act, the Environmental Management Act, the Chiefs Act and the Urban and Regional Planning Act. Such an array of acts has resulted in some instances of conflicting views on land administration by different stakeholders. This confusion, however, is expected to be rectified with the establishment of a land policy that is currently at draft stage. There are a number of pieces of legislation governing the administration of land despite the non-availability of a land policy. These include the Lands Act of 1995, the Housing Act and the Statutory and Improvement Areas Act. In addition, the Land Circular No.1 of 1985 spells out the principal–agent relationship between the Ministry of Lands as the principal and local authorities as agents. Councils in the Kitwe CRFS have been such agents.

3. Agriculture production and productivity issues: the Kitwe CRFS (the core, peripheral and other regions within Zambia) is estimated to have more than 500 000 farmer households (the core and peripheral regions have about 80 000 farmer households) that produce a varied number of crops and livestock, such as maize, soya beans, groundnuts, cattle, pigs, goats and poultry. A number of types of vegetable and fruit are also produced in the region. The region also imports food from the tertiary region to meet the shortfall from internally produced food, particularly for beef, which comes from the Southern and Western Provinces, tomatoes from Mkushi and chickens from Lusaka and Central Provinces. Food from the region including cereals (e.g. maize), vegetables, livestock and dairy products are exported to the peripheral region and the DR Congo. With regard to agronomic practices, a good number of farmers still practise conventional farming (e.g. disc ploughing, maize monocropping and shifting cultivation), but this is slowly being overtaken by the more sustainable and high-yielding conservation agriculture. The major constraints that farmers face include poor road infrastructure, high input costs, lack of credit facilities, poor storage facilities as well as the prevalence of pests and diseases. In terms of input supply, the region has a lot of private sector entities that supply a diverse range of agricultural inputs. However, productivity levels are still very low at less than five tonnes/hectare of maize. The Kitwe city region also struggles with reliable estimates of vegetable production, as the focus of national agriculture production estimates is on cereals, livestock and dairy products.

4. Food processing and storage: the majority of food-processing and manufacturing industries within the Kitwe CFRS generally face operational challenges. Most of these industries are located in Lusaka and only a few are in Ndola and Kitwe. Food processing in the city region primarily hinges on the production of corn meal, wheat products, meat, milk and limited tomato processing. Of the commodities under consideration in this study it is only milk and beef that are processed into other consumer products. Milk is processed by Pamalat while meat processing is carried out by Zambeef, with some butcheries and supermarkets processing meat into mincemeat and sausages. Drying is the main way of adding value to vegetables. There are no significant investments nor policies providing incentives for small-scale processing of vegetables and fruits in the city region.

Storing fresh foods within the region is characterised by traditional methods of storage and preservation by most informal traders and producers. Chain stores, on the other hand, have proper storage facilities and cold rooms. The region faces challenges to prevent fresh foods from going to waste due to a lack of appropriate storage facilities at all nodes of the supply chain, including at formal markets.

5. Food wholesale and distribution: the region has a complex system of food distribution points, which are different for each commodity. Players in the distribution channels include producers, processers, middlemen or brokers, transporters, marketeers and retailers. The governance of the distribution of fresh foods within Kitwe CFRS has proved to be very complex, with a mix of formal and informal channels and a wide array of different actors involved. The region suffers from a poorly developed distribution system with a market network that, to a certain extent, restricts the full participation or access of producers.

6. Food consumption and nutrition: food consumption trends within the region seem to follow a particular pattern for different consumer incomes. High- and middle-income households tend to afford a rich diet of meat, eggs, milk and vegetables compared to low-income and poor households. The region (core, peripheral and other regions within Zambia) suffers from high levels of stunting (50.3 percent for rural; 46.5 percent for urban areas), underweight (13.7 percent for rural; 12 percent for urban areas) and wasting (7.1 percent for rural; 5.8 percent for urban areas). In the core and peripheral regions, stunting affects 48.4 percent of children who are between 3 and 59 months old, while 14.7 percent of this group are underweight and 6.8 percent are wasted.

7. Challenges in agriculture production, processing, distribution and retail: the Kitwe city region has great potential to produce a wide range of food products, but this has not yet been fully tapped. Although all the food products under consideration are locally produced, the demand exceeds supply and the shortfall is made up by importing from outside the region or even from outside the country. The farmer takes the highest risk and is faced with many uncertainties. In addition, any losses resulting from price fluctuations are also borne by the farmer. The players that gain most are the middlemen (traders) since their investment is very minimal. For goods that are highly perishable, such as tomatoes and fresh fish, the retailer also runs some level of risk when the market is slow due to poor food storage infrastructure in the city region. Access to financing, particularly non-collateral credit, for producers and other players along the value chain is a challenge. Other challenges include inadequate agriculture technical services, inadequate technical information, poor road and storage infrastructure and the lack of a knowledge-sharing platform, particularly for small scale producers. A number of measures to address these identified challenges have been proposed (see section 7).

8. Environment and natural resource degradation: agriculture in the Kitwe CRFS impacts on the environment and natural resources through cultivation along water bodies such as streams or river banks, unsafe use of sewer water for irrigation in intra-city urban agriculture, poor management of agrochemicals and excessive land

tillage. In addition to these negative agricultural impacts, both current agricultural land and land suitable for agriculture in the future is also negatively affected by anthropogenic activities. Unsustainable mining and other industrial activities lead to land degradation (i.e. loss of natural soil structure/fertility, ground and surface water contamination, reduced water tables, deforestation and forest degradation). Unsustainable infrastructure construction practices such as horizontal infrastructure development/urban sprawl, road construction projects leading to the creation of burrow pits, vegetation clearing, road grading and construction works near riverbanks similarly cause serious environmental degradation.

9. Stakeholder dialogue process: the food system assessment in the city region of Kitwe was a highly participatory process promoting local ownership and buy-in for the work through stakeholder dialogue. Some of the key players involved in shaping the local food system of the city region of Kitwe are government departments, civil society/NGOs, the private sector, research institutes and academic institutions. More specifically, stakeholders in the Kitwe CRFS can be organised under the following categories:

i. Direct participants in the food value chain: corporate entities, civil society, traders and producer representatives who provide technical services and inputs to farmers.
ii. Organisations that provide awareness and communication: farmer organisations and other civil society organisations, such as the Kitwe District Land Alliance (KDLA), National Traders and Marketeers Association of Zambia (NATMAZ), World Vision Zambia, Sustainable Agriculture Programme (SAP), Zambia National Farmers Union (ZNFU).
iii. 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.
iv. nstitutions and organisations with advisory roles: academia and research institutes, such as the Copperbelt University.
v. 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.

The roles of stakeholders within the city region are sometimes interlinked without noticeable significant conflicts. Some stakeholders have a policy and management role and may therefore be more influential in terms of governance than other stakeholders. These are the national institutions and the municipal governments, all of which have a legislative role to play in the food system, each within its own jurisdiction. However, other stakeholders fill critical gaps in the food system that municipalities, district agriculture and the Zambia Environmental Management Agency (ZEMA) cannot fulfil. These include civil society, research institutes and academia. It is envisaged that the MTT will therefore continue to have a useful role in bringing stakeholders together beyond the completion of this project.

One unintended benefit of the stakeholder consultative process, the constitution of the MTT and later working groups was the broadening of the scope of identifying challenges, strategies and actions beyond solely the information collected in the case studies. Additionally, working group leaders coordinated their respective meetings and minuted discussions, thus increasing the level of stakeholder involvement and ‘buyin’.

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Appendix 1. Composition of the Multi-stakeholder Task Team of Kitwe CRFS assessment and planning process

STAKEHOLDER	ROLE IN FOOD PRODUCTION, MARKETING, CONSUMPTION, NUTRITION, STORAGE & DISTRIBUTION	RESPONSIBILITIES/OBLIGATIONS
Copperbelt University (Kitwe)	Public institution established to provide tertiary education, research & community services.	Trains students in agro-forestry, urban & regional planning, and forestry.
Kitwe City Council (KCC)	Local development & social policy & legislation formulation, management of the city, logistics, markets establishment & management, wholesale & retail businesses management, issuance of manufacturing & trading licences.	Provision of a conducive city service, infrastructure & environment for the healthy & secure production, movement, marketing, storage & consumption of food stuff.
Kitwe District Education Board	Training of community members; sensitisation; scaling up of production units in school in order to contribute to CRFS.	Mandated to promote good health and nutrition in schools and communities through implementation of various policies, including Educating our Future (1996) & School Health and Nutrition Policy (SHN).
Kitwe District Community Health Office	Monitoring aspects related to nutrition of children and pregnant mothers; provision of food packs to HIV & AIDS, TB & pregnant women from poor households.	To effectively and efficiently facilitate provision of equitable social protection and quality primary health-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 Office	National policy & legislation formulation, technical service provider, assessment of production.	Farmer support.
Forestry (District & Research offices)	National policy & legislation formulation, technical service provider, issuance of licences to collect non-timber forest products, analysis of soil.	Ensure food production & the conservation of the environment exist in harmony.
National Aquaculture Research & Development Centre (NARDC)	Provision of and research in the production of quality fingerlings & table-sized fish.	Provide aquaculture support & facilities to fish farmers.

Table continued

STAKEHOLDER	ROLE IN FOOD PRODUCTION, MARKETING, CONSUMPTION, NUTRITION, STORAGE & DISTRIBUTION	RESPONSIBILITIES/OBLIGATIONS
Sustainable Agriculture Programme (SAP)	Provision of agriculture extension to smallholder farmers; input support on various crops; market linkages with government & private sector; capacity building to contribute to smallholder farmers' enhancement of knowledge, i.e. training, exposure learning visits, field days; facilitate storage shed management; promotion of value chain system.	Coordinate programme; linkages with other stakeholders.
World Vision Zambia	Production: community mobilisation into producer groups (PGs); linkages of PGs to technical services to enhance improved production levels & productivity; on-farm & off-farm natural resources management to enhance resilience to production shocks. Marketing/ distribution.	Facilitation of community mobilisation into production structure; linkage for market access; provision of value chain financing; advocacy for a safer food system.
Kitwe District Land Alliance	Advocacy related to issues of land policy, legislation, ownership and conflict.	Sustainability of food.
National Traders and Marketeers Association (NATMAZ)	Represent rights and freedoms of marketeers and traders in Zambia.	Ensure the safe storage of food.
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 farmers do not sell all their produce but store part of it 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) that allows the farmer to select the best market.	• Represent the interests of farmers to government; • Provide financial loans to farmers working in collaboration with ZANACO and NATSAVE banks.
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 (e.g. the National Waste and Sanitation Policy). Streamlining environmental management in national planning.

Appendix 2. List of data for CRFS assessment in Kitwe

CRFS DIMENSION		DATA
1. Agricultural production: land availability, access and tenure; competition between urban development and agriculture; production and productivity issues (including retail but outside Kitwe District)	Diversity of Opportunities for Food Production	i1. Product volumes and diversity imported (from outside the city region) compared with product volumes from the city region.
		i2. Number/type of farms in the city region that use locally grown or other (organic/ecological/ Fair Trade) product labels.
		i4. Number/percentage of farms in the city region with direct sales to consumers; trading direct at markets or selling direct to retailers or caterers.
	Social Conditions for Food Producers	i5. Access to land and secure ownership/tenure arrangements for food production in the city region for various types of producer.
		i6. Number and type/characteristics of people (differentiate for women, young people and other vulnerable groups) involved in city region food production.
		i7. Number of children under age (child labour) employed in city region food production.
	Economic Value of Food Production Sector in the City Region	i9. Average food price data for different food products/ commodities (value of city region food production vs. total value of food imported). Note: if possible compare farm gate and retail prices for selected commodities.
		i10. Number (or percentage) of farms (farm types) in the city region (economic vitality) for different food products.
	Status of Natural Resource Management	i21. Total surface areas (current and potentially available but currently unfarmed) of urban and peri-urban and rural agriculture land within the city region.
		i32. Status of natural biodiversity in the city region.
		i37. Codes/regulations that allow/promote urban and peri-urban/city region food production.
	Levels of Vulnerability and Conditions for Increasing Resilience	i44. Percentage of self-reliance (for the city region) in consumption of food by weight for specific product/ prioritised food basket/total nutritional requirements or total consumption (possibly transform this also into food expenditures using average food price data).
		i47. Availability and accessibility of urban agriculture/ community gardens to all residents within the city region, especially of low income.
		i49. Potential for increase in decent employment and income opportunities (multiplier effect) in city region food production and input supply.
		i50. Extent to which production practices favour efficient use of abiotic resources (land/soil, water, nutrients)
		i52. Degree to which livestock feed is produced within the city region (percentage of self-reliance in fodder production).

Table continued

CRFS DIMENSION		DATA
2. Food processing, supply and distribution system (including consumption & nutrition but outside Kitwe District)	Number and Diversity of Food-processing Businesses	i54. Type, number and geographic spread of food storage/processing/manufacturing businesses in the city region.
	Economic Value of Food Production Sector in the City Region	9. Average food price data for different food products/ commodities (value of city region food production vs. total value of food imported). Note: if possible compare farm gate and retail prices for selected commodities.
	Presence and Impact of Related Policy	I77. Compliance with food safety regulations and regular inspections related to food storage and processing in the city region.
		i177. Food quality: extent to which low-income residents have access to/can afford local, safe, nutritious/ healthy food in different areas in the city region. Note: using data from dietary diversity scores and food intake, indications can be given on specific food intake and deficiencies (food security).
		i132. Policies around street-food catering and markets, e.g. licence, food safety and hygiene, infrastructure support in the city region.
	Levels of Vulnerability and Conditions for Increasing Resilience	i81. Potential for increase in decent employment and income opportunities (multiplier effect) in city region food wholesale and distribution.
		i137. Diversity in food retail and catering in the city region (for selected food products).
	Diversity of Opportunities for Food Wholesaler and Distribution Businesses	i83. Number, type and geographic spread of food wholesale/distribution points in the city region (for different products).
	Economic Conditions for Food Wholesale and Distribution Workers	i92. Infrastructure needs for improved city region wholesale and distribution businesses efficiency.
	Levels of Vulnerability and Conditions for Increasing Resilience	i104. Transport efficiency: current and potential use of food transport and storage in city region with low energy use/more optimised distribution – reduction of transport distance and emissions
		i107. Potential for increase in decent employment and income opportunities (multiplier effect) in city region food wholesale and distribution.
		i144. Availability of local and traditional crops and products for residents from different wealth classes in different areas of the city region.
		i177. Food quality: extent to which low-income residents have access to/can afford local, safe, nutritious/ healthy food in different areas in the city region. Note: using data from dietary diversity scores and food intake, indications can be given on specific food intake and deficiencies (food security).
	Diversity of Opportunities for Consumers to Eat Well	i147. Total food/nutritional requirements for the population in the city region. (Household food nutrition requirements multiplied by number of city region population). May be specified for specific food products. If possible, differentiate within categories, e.g. children, adolescents, adults and elderly.

Table continued

CRFS DIMENSION		DATA
2. Food processing, supply and distribution system (including consumption & nutrition but outside Kitwe District)	Social Conditions for Consumers	i155. Availability of household facilities for storage of food and of energy sources for cooking for different consumers in different areas of the city region.
		i153. Food choice: percentage of city region population (per wealth class; children) eating more than five fruits and vegetables a day and average intake of fruit and vegetables for different types of consumer.
	Presence and Impact of Related Policy	i169. Presence of consumer skills/training cooking programmes (e.g. how to cook from scratch; this also implies knowledge regarding preparation and cultural role).
	Status of Food Waste Management Approaches	i182. Volumes of wasted food used directly for human consumption, e.g. by food banks/soup kitchens in the city region.
3. Status of environment and natural resources degradation	Status of Natural Resource Management	i28. Pressure on water resources within the city region. Water use (limitations) and competition: agricultural water withdrawal/renewable water resources.
		i32. Status of natural biodiversity in the city region.
		i36. Policies, regulations and support for the preservation of agricultural land; use of open space/ zoning, etc. relevant for the city region.

Appendix 3. Indicative data collection method for the food area categories

THEME	DATA COLLECTION METHOD	RESPONDENTS	SAMPLING LOCATION
1. Food processing, supply and distribution system	Questionnaire, interview, FDGs, mapping (locations & food flows)	Local authorities, CSOs, private sector (marketeers, processors, retailers, distributors), vendors, CSO, MoA, MoH, PACRA, NWSC, Labour Office	All 9 districts + Kitwe (only retail)
2. Food consumption and nutrition at city region level (out of Kitwe District)	Questionnaire, interview, FDGs, mapping (locations & food flows); 24-hour diet recall	Local authorities, CSOs, marketeers, vendors, households, CSO, MoA, MoH, Labour Office	Only 9 districts excluding Kitwe
3. Agriculture production: land availability, access and tenure; competition between urban development and agriculture; production and productivity issues	Questionnaire, interview, FDGs, mapping (locations & food flows), develop land use & cover maps	Local authorities, CSOs, farmers, MoA, MoL, Fisheries, Forestry, input suppliers (i.e. Amiran, SeedCo)	All 10 districts
4. Status of environment and natural resources degradation	Questionnaire, interview, FDGs, use of existing land cover maps	Local authorities, CSOs, farmers, MoA, MoL, Forestry	All 10 districts

NB: CSO=civil society organisation; MoA=Ministry of Agriculture; MoH=Ministry of Health; MoL=Ministry of Lands; NWSC=Knana Water & Sewerage Company.

Appendix 4a: Summary of methods for collecting data and information on food processing, supply and distribution system

MAIN CATEGORY	DATA DESCRIPTION	DATA COLLECTION TOOL	TARGET RESPONDENT	NO. OF RESPONDENTS
Food flows	1. Quantities of commodities marketed 2. Map stakeholders in production 3. Map stakeholders in markets, retail & wholesale 4. Number of stakeholders in production & consumption (marketing & retail) 5. Maps of roads, storage facilities, processing & manufacturing plants, wholesale markets, food retail outlets (malls, supermarkets, informal markets, etc.) & catering	1. Questionnaire interview 2. Focus Group Discussion 3. Questionnaire interview 4. Questionnaire interview & focus group discussion 5. Android device/ GPS - collection of geo-references/ location points & production of map	1. CSO, NATMAZ, marketeers & retailers 2. Key informants (KDLA, MoA, CSO, KCC, SAP, WVI, agro-input retailers x 2) 3. Key informants (MoA, CSO, KCC, SAP, WVI, NATMAZ, agro-input retailers x 2) 4. As in 3 plus FGD (not exceeding 10 people) 5. Local authorities, Chamber of Commerce, CSO	1. CSO (x1), NATMAZ (x1), marketeers (x10 per market), retailers (x5 small & x5 large retailers per district) 2. FDG not exceeding 10 people 3. Eight (8) stakeholders 4. As in 3 plus FDG not exceeding 10 people 5. N/A
Infrastructure	1. Transportation: type, capacity, quality of roads and other used transportation modes 2. Storage facilities: type, capacity, quality (safety) 3. Wholesale markets: type, capacity, quality (food safety), regulations 4. Retail markets: type, capacity, quality (food safety), regulations 5. Catering facilities : type, capacity, quality (safety) 6. Informal markets: type, capacity, quality (food safety), regulations 7. Analyse sanitation, health and employment conditions	1. Questionnaire interview, geo-references (GPS) & analysis of district infrastructure reports 2. As in (1) 3. As in (1) 4. As in (1) 5. As in (1) 6. As in (1) 7. Questionnaire interview & review of labour regulations	1. Local authorities, marketeers, CSO (ZNFU, NATMAZ, EIZ, WVI), MoA 2. Local authorities, marketeers, CSO (ZNFU, NATMAZ, WVI), MoA, MoH 3. As in (2) 4. As in (2) 5. As in (2) plus Chamber of Commerce & PACRA 6. As in (2) 7. As in (2) plus NWSC, Labour Office	1. Local authorities (x9), marketeers (x10), CSO (x4), MoA 2. As in (1) plus MoH 3. As in (2) 4. As in (2) 5. As in (2) plus Chamber of Commerce & PACRA 6. As in (2) 7. As in (2) plus NWSC, ZCTU & Labour Office

Table continued

MAIN CATEGORY	DATA DESCRIPTION	DATA COLLECTION TOOL	TARGET RESPONDENT	NO. OF RESPONDENTS
Governance of markets	1. Role of middlemen 2. Market access for smallholders: markets, procedure, facilitators, & obstacles 3. Competition between local and imported products (only for products that are produced locally & imported)	1. Questionnaire interview & FDG 2. FDG & questionnaire interview 3. Questionnaire & observation	1. Local authority, CSO (ZNFU, NATMAZ, WVI), marketeers 2. FDG (Local authority, MoA + CSOs), interview (marketeers) 3. FDG (as in (2)), interview with retailers, marketeers + street vendors (for fruit)	1. LG (x10), CSOs (x3), marketeers (x10). 2. FDG (Local authority, MoA, ZNFU, NATMAZ, WVI) & interview (marketeers x10) 3. As in (2) plus five fruit vendors per district
Governance of employment	Analyse employment and level of wages paid	1. FDG 2. Questionnaire interview of producers, retailers + distribution 3. Analysis of MoA, CSO & Min. of Labour statistics	1. FDG (CSO, Labour Office, MoA, ZNFU) 2. Questionnaire interview (producers, retailers, distributors). 3. Employment stats from MoA, CSO & Labour Office	1. FDG (CSO, Labour Office, MoA, ZNFU). 2. Producers who employ (x10 smallscale; x10 commercial scale), retailers (x10 small scale, x2 supermarkets, x10 marketeers, 5 vendors), distributors (x2)
Governance of product prices	1. Cost of production, primary processing, transportation & storage 2. Commodity prices and their dynamics (seasonal & daily) at farm gate, wholesale and retail 3. Price generation mechanisms from farm to retail	1. Questionnaire interview of producers, retailers, transporters, distributors, MoA, CSO, local government 2. Questionnaire interview of producers, retailers & wholesalers, MoA + CSO 3. Questionnaire interview of producers, retailers, MoA & CSO	1. Producers, retailers, transporters, distributors, fisheries, MoA, CSO, LG	1. Producers (x10 small scale, x10 commercial scale), retailers (x10 small scale, x2 supermarkets, x10 marketeers, 5 vendors), transporters (x5), distributors (x2), fisheries, MoA, CSO (ZNFU, WVI) 2. Producers (x10 small scale, x10 commercial scale), retailers (x10 small scale, x2 supermarkets, x10 marketeers, 5 vendors), wholesalers (x5), fisheries, MoA, CSO (ZNFU, WVI) 3. Producers (x10 small scale, x10 commercial scale), retailers (x10 small scale, x2 supermarkets, x10 marketeers, 5 vendors), fisheries, MoA, CSO (ZNFU, WVI)

Table continued

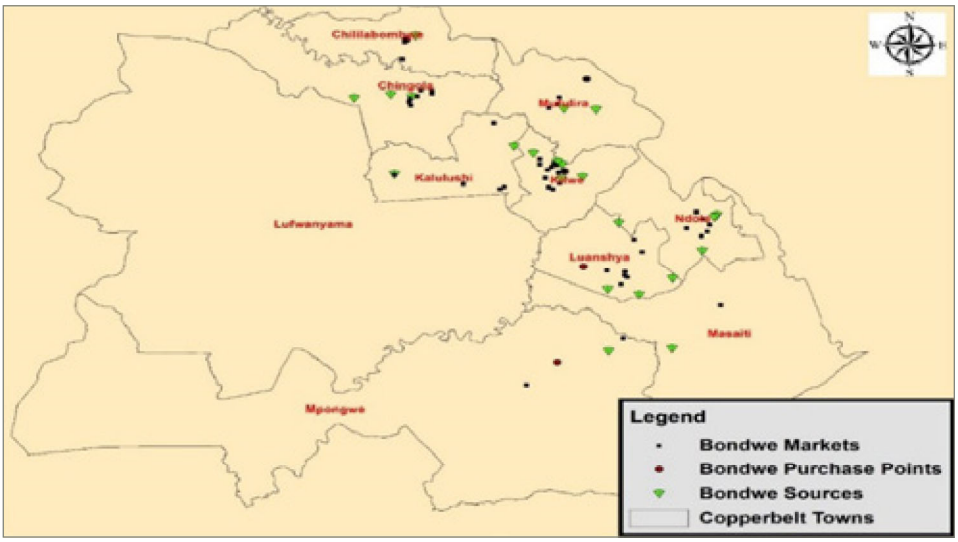
MAIN CATEGORY	DATA DESCRIPTION	DATA COLLECTION TOOL	TARGET RESPONDENT	NO. OF RESPONDENTS
Energy	1. Energy sources 2. Kind of energy used 3. Food step(s) that require(s) more energy 4. Waste of energy along the food chain	FGDs, questionnaire interview & analysis of CSO, MoA & Min. of Energy (MoE) records	1. FGD: MoE, MoA, Central Statistical Office, LG, ZNFU, ZESCO 2. Questionnaire interview: producers, processors, storage, MoA, MoE, ZNFU 3. Stats from MoA, MoE & CSO	1. MoA, MoE, CSO, LG, ZNFU, ZESCO 2. Producers (x10 small scale, x10 commercial scale), processors (x10 primary, x10 secondary or combination), storage (x5), MoA, MoE, ZNFU
Food loss & waste	Type of food wasted, quantities, reasons, waste food management from: 1. Major markets 2. Transport, storage, & processing 3. Households	1a. FGD 1b. Questionnaire interview 2. Questionnaire interview 3. Questionnaire interview	1a. CopWaste, MoA, ZNFU, WVI, LG, NATMAZ 1b. Marketeers + vendors 2. Transporters, storage, processors (producers + other processors) 3. Households	1a. CopWaste, MoA, ZNFU, WVI, LG, NATMAZ 1b. Marketeers (x10) + vendors (x5) 2. Transporters (x5), storage (x5), processors (producers x10, other processors x10)

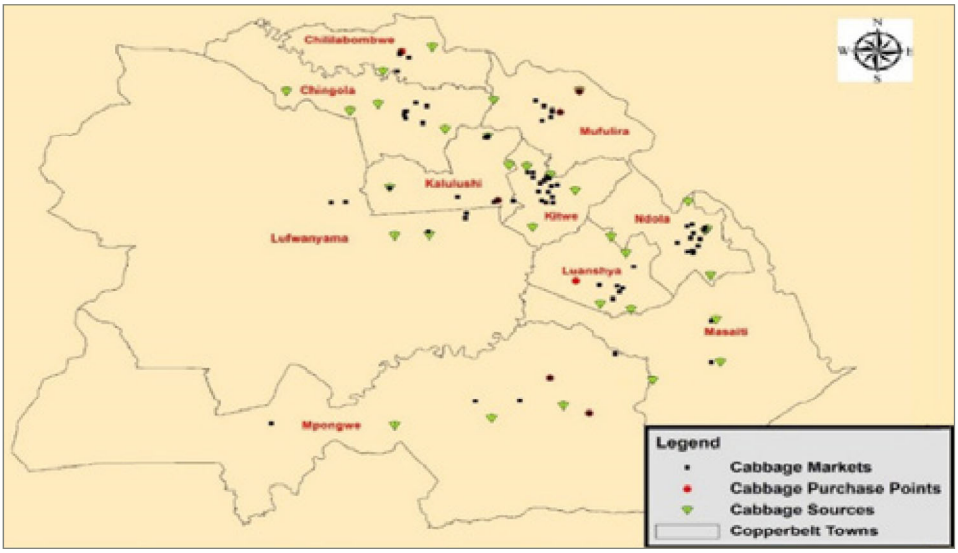
Appendix 4b. Summary of methods for collecting data and information on food consumption and nutrition at city level

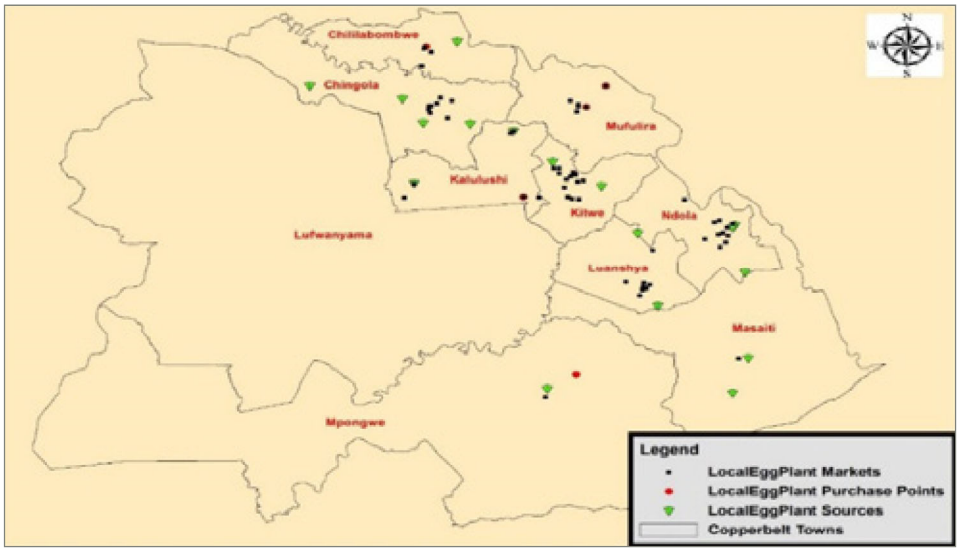
MAIN CATEGORY	DATA DESCRIPTION	DATA COLLECTION TOOL	TARGET RESPONDENT	NO. OF RESPONDENTS
Malnutrition and food insecurity	1. Numbers on food insecurity and malnutrition among the overall population and the most vulnerable groups (children <5 yr. & women) 2. Numbers on obesity	1. Questionnaire interview 2. FGD 3. Analysis of MoH, LG, CSO, NFNC, MDCSS, JCTR & CSOs stats	1. MoH, NFNC, MDCSS, JCTR 2. MoH, LG, NFNC, MDCSS, JCTR, CSOs, CSO	1. MoH, NFNC, MDCSS 2. FDG: MoH, LG, CSO, NFNC, MDCSS, JCTR & CSOs
Food demand	1. Most consumed food commodities in the CRFS in terms of meat products, dairy, fruit, vegetables and staples (food demand), quantity and quality 2. Food consumed daily by social, economic and cultural groups 3. Where food insecure people live 4. Social, economic and cultural groups of the food-insecure people	1. 24-hour diet recall 2. As in (1) 3 & 4. Questionnaire interview 3 & 4. Analysis of stats	1. Households 2. As in (1) 3 & 4. MoH, LG, CSO, NFNC, MDCSS, JCTR & CSOs 3 & 4. MoH, LG, CSO, NFNC, MDCSS, JCTR & CSOs stats	1. Households (x25 low density, x25 medium density, x25 high density). 2. FGD: MoH, LG, CSOs, NFNC, MDCSS, JCTR & CSO
Drivers for food insecurity and malnutrition	Economic and physical access to the markets for households: 1. Where people buy their food 2. Affordability 3. Spatial analysis to correlate food insecurity and access to food retail	1&2. Questionnaire interview 3. FAO tool for analysis	1&2. Households	1&2. Households (x25 low density, x25 medium density, x25 high density)
Sustainable diets	1. Quality and diversity of the food available 2. Availability of diverse food items (changes with the seasons) 3. Quality of food in terms of safety and nutritional value 4. Knowledge and awareness on sustainable and healthy diets	1a. Questionnaire 1b. Retail market survey 2. As in (1) above 3&4. Questionnaire survey	1a. Households 1b. Observational survey 2. As in (1) above 3&4. Households, MoH, NFNC, MDCSS, JCTR	1a. Households (x25 low density, x25 medium density, x25 high density) 1b. markets (x3 informal, x3 formal & large, x6 vendors 2 in each location where a market is located) 2. As in (1) above 3. Households (x25 low density, x25 medium density, x25 high density), MoH, NFNC, MDCSS, JCTR

Appendix 5. Maps – vegetable production and markets in the CRFS (Copperbelt and Kitwe)

The maps below show production sources, purchase/distribution points, markets and retail outlets for the following vegetables: amaranth (bondwe), cabbage, local eggplant, Chinese cabbage, onion, pumpkin leaves, tomato and rape. Production sources, purchase/distribution points, markets and retail outlets for (clockwise from top left): amaranth (bondwe), cabbage, local eggplant and Chinese cabbage.



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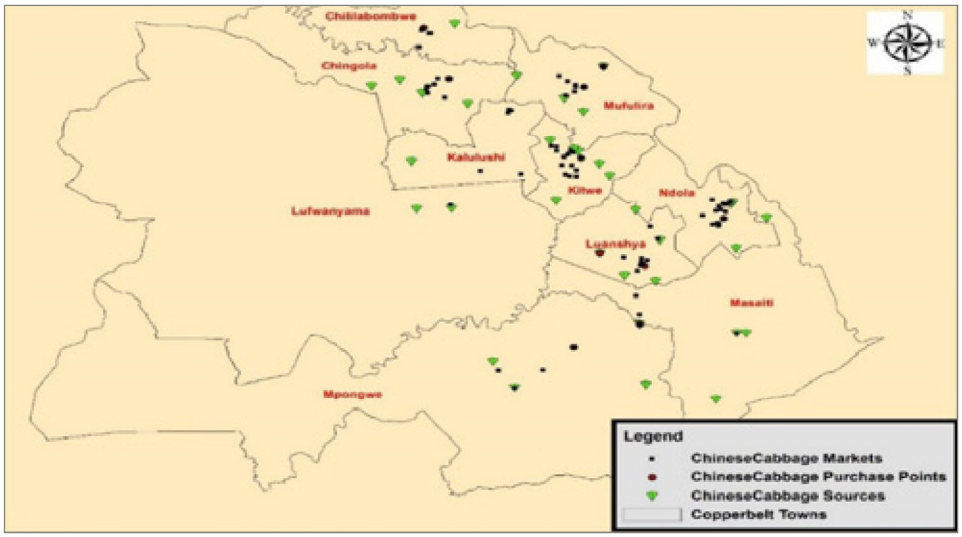
LocalEggPlant Purchase Points
LocalEggPlant Sources
Copperbelt Towns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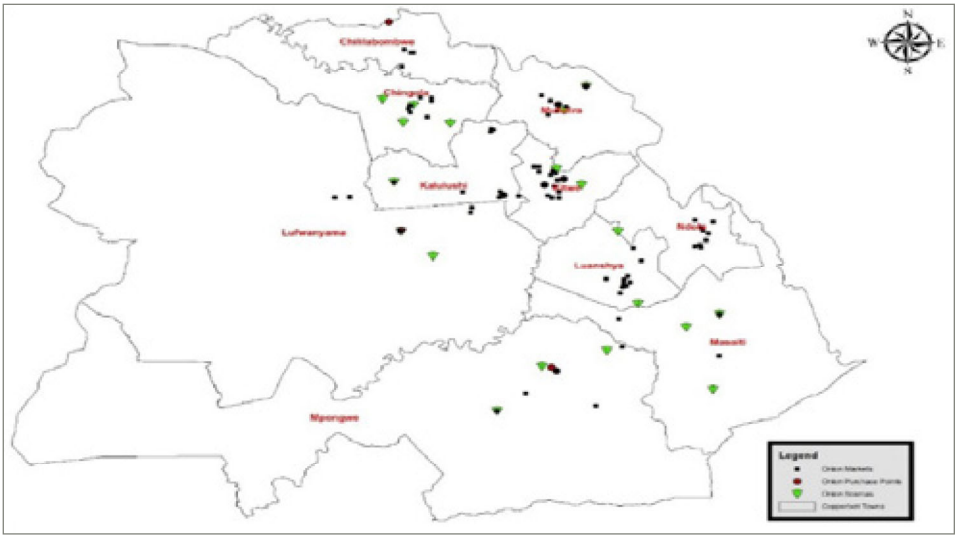
ChineseCabbage Purchase Points
ChineseCabbage Sources
Copperbelt Towns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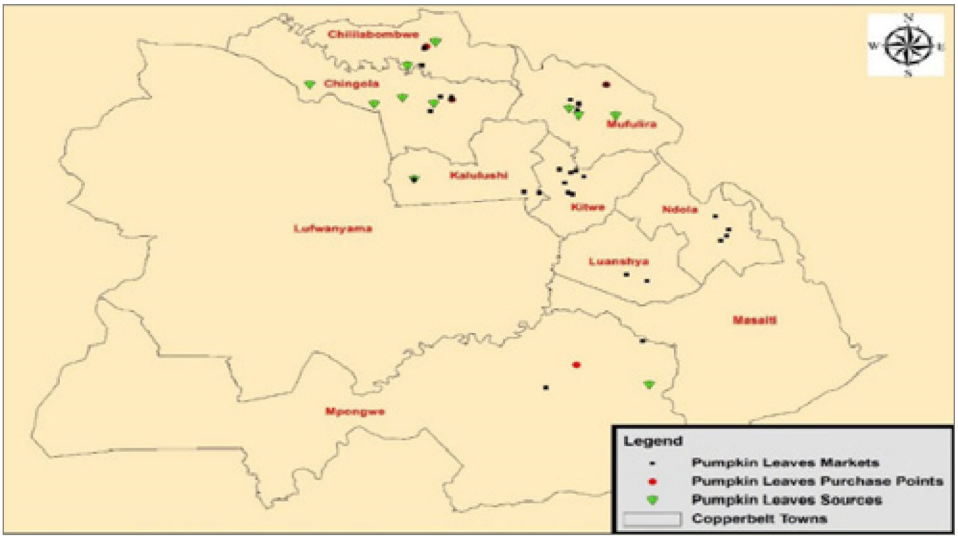
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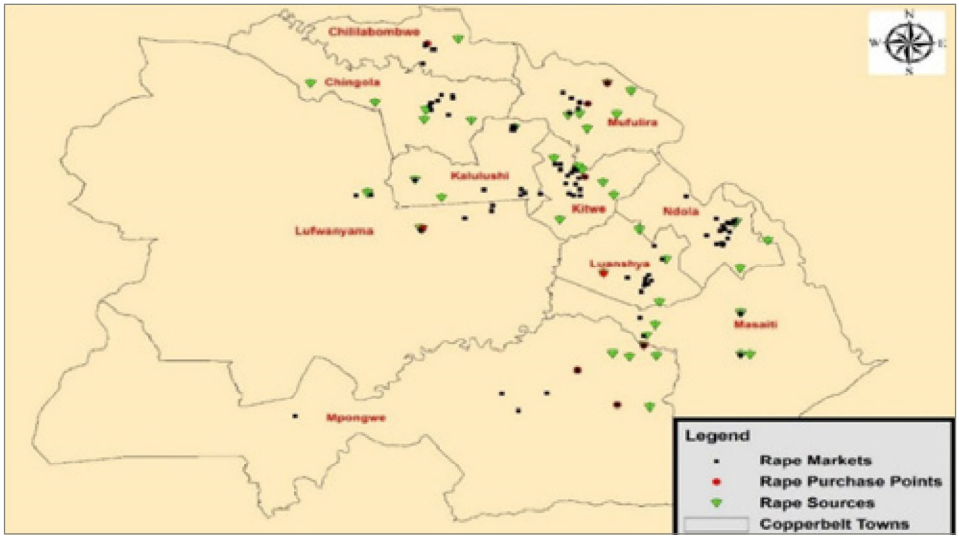
Pumpkin Leaves Sources
Copperbelt Towns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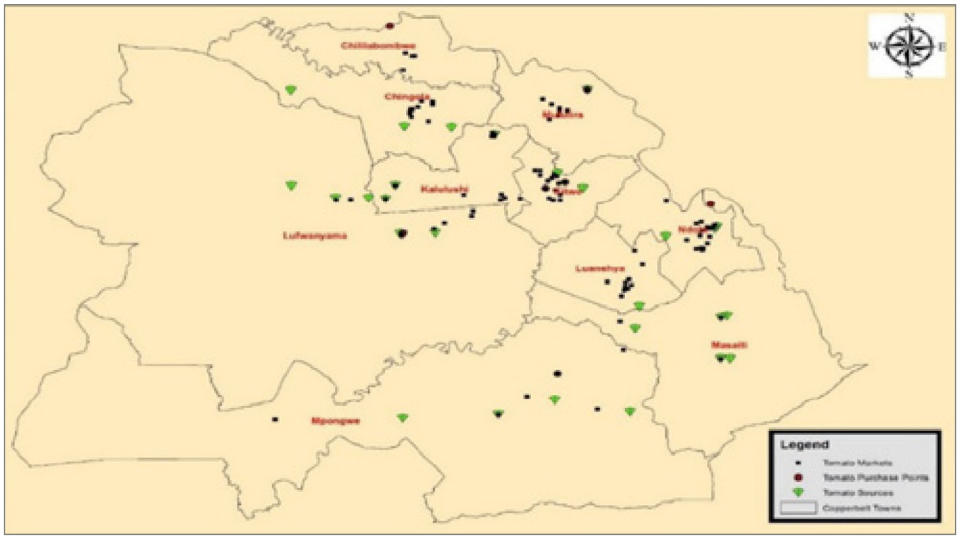
Rape Markets
Rape Purchase Points
Rape Sources
Copperbelt Towns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Appendix 6. Types of household facility for food storage

	RESIDENTIAL AREA INCOME CLASSIFICATION		
TYPE OF HOUSEHOLD STORAGE FACILITIES USED	HIGH	LOW	MEDIUM
Baskets	0	25	75
Baskets + shelf	0	100	0
Basket + tray	0	100	0
Basket + tray + rack	0	100	0
Bowl	0	50	50
Boxes + fridge + pantry	100	0	0
Boxes + shelf + sacks	100	0	0
Box + shelf	0	0	100
Bucket + bins	0	0	100
Buckets	0	100	0
Cardboard	0	33.3	66.7
Colander + rack	0	100	0
Freezer	47.4	0	52.6
Freezer + colander + rack	0	0	100
Freezer + plastics + shelf	100	0	0
Freezer + rack	82.5	10	7.5
Freezer + shelf + bowl	100	0	0
Fridge + deep freezer + storage bins + bowl	0	0	100
Fridge + storage bucket + plastic bags + bowl	0	0	100
Fridges	43.4	8.4	48.3
Fridges + basket + bowl	100	0	0
Fridges + bins + bowl	63.9	22.2	13.9
Fridges + bowl	38.2	0	61.8
Fridges + bucket + shelf + bins	0	100	0
Fridges + bucket + shelf + jars	0	0	100
Fridges + freezer + bins	100	0	0
Fridges + freezer + bins + bowl	0	0	100
Fridges + freezer + bins + shelf + bowl	100	0	0
Fridges + freezer + bowl + jar	0	0	100
Fridges + freezer + shelf + bins	100	0	0
Fridges + paper + bags	100	0	0
Fridges + plastics + bin + bowl	0	0	100
Fridges + plastics + bucket + bowl	0	0	100
Fridges + plastics + bin + bowl	0	100	0
Fridges + plastics + shelf + bin	100	0	0
Fridges + rack	50.3	22.8	26.8

Table continued

TYPE OF HOUSEHOLD STORAGE FACILITIES USED	RESIDENTIAL AREA INCOME CLASSIFICATION		
	HIGH	LOW	MEDIUM
Fridges + rack + sack	100	0	0
Fridges + rack + shelf	100	0	0
Fridges + shelf	23.5	4.0	72.5
Fridges + shelf + bowl	100	0	0
Fridges + shelf + boxes	100	0	0
Fridges + warmer + bowl	100	0	0
Paper bags + plastics	0	100	0
Plastics	0	65	35
Plastics + basket	0	100	0
Plastics + basket + sack	0	100	0
Plastics + bins + bowl	0	100	0
Plastics + bins + sack + bowl	0	100	0
Plastics + bowl	0	0	100
Plastics + buckets + bins + bowl	0	100	0
Plastics + trays + sack	0	100	0
Plastics + trays + sack + bowl	0	100	0
Rack	0	96.2	3.8
Shelf	0	93.3	6.7
Tray + rack	0	100	0

Appendix7. Stakeholder Thematic Working Group outputs on areas of Intervention and Strategies

1. Agriculture production working group

Challenges with prioritised strategies

	CHALLENGE	STRATEGY	RESPONSIBLE INSTITUTIONS
1.	Inadequate Extension Services	Employing more Extension Officers to reduce Farmer–Officer Ratio to 400–1	MoA, Ministry of Finance
		Promote Private Sector-driven Extension Service delivery (teaming up with private sector in extension service delivery) (upgrading the curriculum of extension staff)	Private companies, CFU, seed companies, agro dealers
		Capacity building of Extension Officers (scaling up of extension officers in terms of qualifications) (Agro-Training institutions should upgrade the curriculum in both areas of theoretical and practical point of view)	MoA, agricultural training institutuions
		Improve mobility of Extension Officers	MoA (local authorities)
		Construction of camp and block houses	MoA (local authorities)
		Establishment of farm blocks	MoA (local authorities)
2.	Agricultural Infrastructure and Mechanisation	Construct and rehabilitate FEEDER roads	Local authorities, ZNS, RDA, GRZ
		Construction of bulk storage facilities, e.g. cold-storage sheds, silos	MoA, local authorities, private companies
		Promoting access to farm machinery via PPPs	Local authority, MOA ,private companies, GRZ, SARO, Amiran, AgriChem, CAMCO
		Promotion of communal ownership of machinery	Cooperative unions, MoA, community groups, community development
		Setting up of irrigation schemes	Local authority, ZEMA, water authority
		Employing technical staff in irrigation and farm power and mechanisation	MoA, Ministry of Finance
3.	Inadequate Access to Agricultural Financing	Give farmers access to non-collateral farm loans/Insured Credits	ZNFU, MoA, banks/insurance companies, World Bank
		Promote contract farming	Zambia Breweries, SEBA Foods, COMACO (community market for conservation)
		Promote Pass-on-the-Gift	Heifer International, MoA, community development
		Promote low-input farming	CFU, FAO, OPPAZ, MoA
4.	Harmonisation of stakeholders` approach to land tenure	Hastening decentralisation process of ministry of lands (land tenure)	Local authority, Ministry of Lands
		Creation of digital maps	Local authority, Ministry of Lands

Implementation Framework

	CHALLENGE	STRATEGY	ACTIVITIES	TIME FRAME	BUDGET	RESPONSIBLE INSTITUTIONS	OUTPUT	OUTCOME/ BENEFICIARIES
1.	Inadequate Extension Services	Improving on the Agriculture Extension Services through radio programmes, farm forums, capacity building of Extension Officers (scaling up of Extension Officers in terms of qualifications) (Agro-Training institutions should upgrade the curriculum in both areas of theoretical and practical point of view)	1. In-service training for the Extension Officers	2 Trainings per year	ZMW94 000 X 10 Districts	Private institutions (e.g. mobile network providers, radio stations, etc.) MoA & ZNFU	30 Extension Officers will be trained per district	Improved extension service delivery (an indicator will be the number of farmers accessing extension service)
			2. Farmer sensitisation meetings (use of ICTs)	Quarterly	ZMW3 000 X 4 meetings per district	MoA, ZNFU, CBU	600 sensitisation meetings (150 meetings per quarter held)	Number of farmers accessing improved agriculture Extension Services through ICTs
		Promote private sector-driven Extension Service delivery (teaming up with private sector in extension service delivery) (upgrading the curriculum of extension staff)	Lobbying for private sector participation (review meetings)	Quarterly	ZMW120 000 for all 10 districts	MoA, ZNFU	3 farmer promoters per camp	Farmers able to receive extension services
		Improve mobility of Extension Officers	Procurement of motor bikes and lease out to Extension Officers	1 year	ZMW30 000 per motor bike	GRZ and private sector	154 motor bikes procured and leased out to camp Extension Officers	Increased number of farmers accessing extension services

Table continued

	CHALLENGE	STRATEGY	ACTIVITIES	TIME FRAME	BUDGET	RESPONSIBLE INSTITUTIONS	OUTPUT	OUTCOME/ BENEFICIARIES
2.	Agricultural Infrastructure and Mechanisation	Promoting access to farm machinery via PPPs	Setting up of farm machinery units (1 per district)	2 years	ZMW200 000 per set of farm machinery X 10 districts	GRZ, FAO ZNFU, Musika	One set of farm machinery per district	Increased area cultivated by farmer through utilisation of machinery set in the district
3.	Inadequate Access to Agricultural Financing	Promote contract farming	Engage stakeholders (farmer linkages with stakeholders)	Quarterly	ZMW3 000 per quarter per district	MoA, Ministry of Commerce, local government	4 meetings per year	Number of farmers engaged in contracts
		Promote Pass-on-the-Gift	Creation of a seed bank (livestock and an input pack of seed fertiliser and herbicides)	1 year	ZMW12 000 per District (For training of farmers in modalities of Pass on the Gift)	MoA, Heifer, NGOs	20 farmers receiving Pass on the Gift packages	Number of farmers helped financially through Pass on the Gift
		Promote Low-input Farming	Training farmers in conservation farming	1 year	ZMW3 000 X 150 agriculture camps (in all districts)	GRZ, FAO, local government	50 farmers per camp	Farmers accessing the technology (farmers reducing the cost of production)

2. Agro-processing, distribution and marketing working group

A. Re-establishing and establishment of processing companies.
B. Empowering and promoting small-scale processing companies or farmers and raising awareness on the importance and benefits of processing food.

Activities

A. Training and capacity building in agro-processing skills
B. Accessibility of credit finance facilities
C. Empowering with agro -processing equipment, e.g. solar dryers
D. Exchange visits among agro-processing groups, networking and formation of associations.

Budgets

Stakeholder meeting for agro-processors and trainers, marketeers and interested parties, consisting 40 people – K50 000.

Expected Outcomes

A report on the meeting.

Beneficiaries

A. Small-scale farmers
B. Agro-training Institution
C. Marketeers
D. Trainers and the interested parties.

C. Increased research in agro-processing and development.

Activities

Research in:

A. Transportation and distribution
B. Processing, packaging and storage
C. Consumption and nutrition
D. Value addition
E. Waste management.

Budget

Stakeholder meetings of 40 people, including venue hire and transportation refunds – ZMW50 000

Challenges

A. Lack of incentives to help with research
B. Lack of resources.

Expected Outcomes

Reports on the findings of the research done in specific areas.

Beneficiaries

A. The Government
B. Research & academic institutions
C. Small- and medium-scale farmers

3. Food value chain working group

CHALLENGE	MAIN STRATEGY	ACTIVITY	BUDGET	SOURCES	OUTPUT	EXPECTED OUTCOMES	BENEFICIARIES	IMPLEMENTER	TIME FRAME
Poor access to high-value markets	Sensitisation and capacity building on packaging, grading, labelling and commodity sorting	Training workshop on packaging, labelling, grading and commodity sorting for value chain actors	Venue, meals, stationery, facilitator's fee	GRZ (Ministry of Commerce) NGOs, private sector (FAO)	Information on the importance of product packaging, grading, labelling and sorting disseminated to the value chain stakeholders Value chain actors capacity in sorting, grading, labelling and packaging	Increased access to high-value markets, optimised returns on investments for value chain actors	Producers, processors, retailers and consumers	Main implementer: Zambia Development Agency (ZDA) Others: Zambia Bureau of Standards (ZABS), Zambia Marketing Associations (ZMA), National Association for Traders and Marketeers of Zambia (NATMAZ), Zambia National Farmers Union (ZNFU), Consumer and Competition Protection Commission (CCPC)	By December 2017
Mistrust among value chain actors	Promoting linkages among value chain actors	Sensitisation workshops on the importance of linkages among value chain actors Facilitating creation of platforms where actors interact and strengthen their relationships through existing producer and trader associations	Venue, meals, Stationery, Facilitator's fee, transport fuel and lubricants Venue, meals, Stationery, Facilitator's fee, transport fuel and lubricants	GRZ (Ministry of Commerce, Zambia Marketing Association) NGOs, (FAO) private sector Platforms created	Sensitisation workshops on the importance of linkages among value chain actors Platforms where actors interact and strengthen their relationships through existing producer and trader associations	Producers and processors respect each other's roles Mutual trust between producers and processors Increased productivity and returns on imvestment Increased interactions between producers and processors	Producers, processors, retailers and consumers	Main Implementer: Ministry of Commerce and Ministry of Agriculture Others: Zambia Bureau of Standards (ZABS), National Association for Traders and Marketeers of Zambia (NATMAZ), Zambia National Farmers Union (ZNFU)	January 2018

Table continued

CHALLENGE	MAIN STRATEGY	ACTIVITY	BUDGET	SOURCES	OUTPUT	EXPECTED OUTCOMES	BENEFICIARIES	IMPLEMENTER	TIME FRAME
Poor access to long-term credit	Promoting provision of tailor-made credit packages and capacity building in developing viable business plans	Sensitisation workshops on the importance of tailor-made packages to meet unique financial needs Training workshops on developing viable business plans that are critical for accessing long-term credits	Venue, meals	GRZ (Ministry of Commerce, Zambia Marketing Association) NATMAZ	Sensitisation workshops on the importance of tailor-made packages Training workshops on developing viable business plans that are critical for accessing long-term credits	Provision of tailor-made facilities Increased production and productivity, and return on investment Actors ability to develop business plans sharpened	Financial institutions, producers, processors and consumers	Main implementers Ministry of Commerce and Trade Others Bankers Association of Zambia (BAZ) Zambia Chamber of Commerce (ZACC)	February 2018

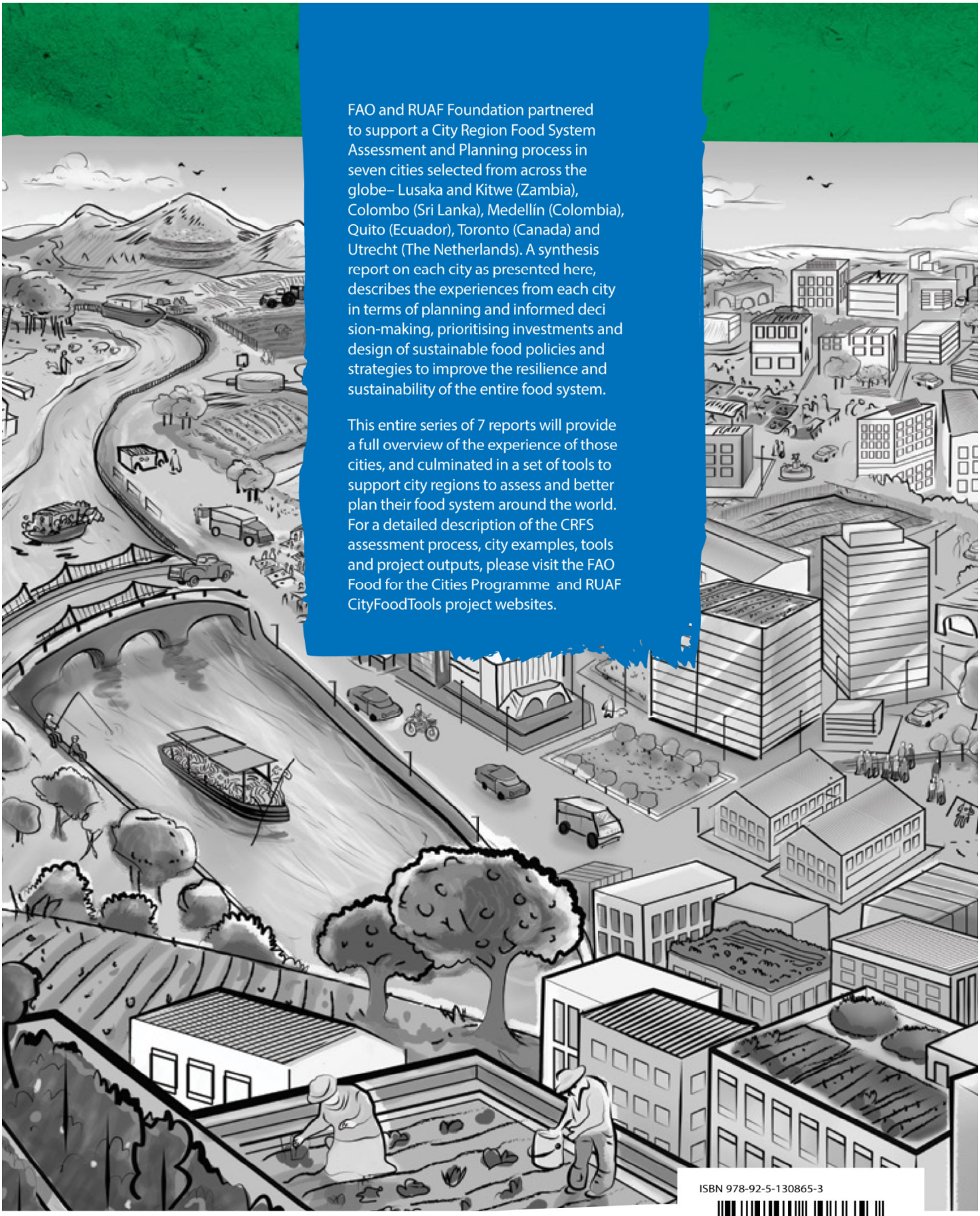
4. Environment and natural resource degradation working group

PROZBLEM	STRATEGIES	OUTPUT	TARGET GROUP	RESPONSIBLE GROUP	TIME FRAME	RESOURCES
Unsustainable Natural Resources Management	Holding awareness campaigns in all wards	Awareness campaigns held in every ward	Community (all wards)	- Local authorities - Forestry - NGOs - Ministry of Agriculture	3 months	- PA system - Food/refreshment - Transport refunds - Fuel - Drama groups and marchers
	Establish community tree nursery in all wards	Community tree nurseries established in every ward	Community and institutions	- Local authorities - Forestry	4 months	- Polythene pots - Nursery equipment - Nursery sites - Inputs - Personnel expertise - Transport
Use of Agrochemicals	Training farmers in Integrated Pest Management Control (IPMC)	Farmers trained in IPMC	Farmers in the Copperbelt Region	- MACO - SAPP - ZNFU - NGOs	1 month	- Training materials - Facilitators - Venue - Fuel - Refreshment - Transport
Excessive Land Tillage	Promoting sustainable farming practices	Farmers trained in conservative farming methods such as zero tillage	Farmers in the Copperbelt Region	- MACO - NGO - ZNFU	1 month	- Training materials - Facilitators - Venue - Fuel - Refreshment - Transport
Use of Sewage for Irrigation	Enforcing the law	- Identified communities sensitised on the consequence of breaking law and dangers of using raw sewer for irrigation - Law enforced in identified communities	- Identified communities in the Copperbelt - Identified farmers	- Water Utility Companies - Local Authorities - MACO - MOH	Ongoing	- Stationery - Personnel - Transport - Fuel - Finances - Food/refreshment
	Setting up irrigation schemes	Irrigation schemes established in selected area	Farmers in the identified communities	- Water utility companies - Local authorities - MACO	18 months	- Land - Irrigation engineers - Finances - Labour, irrigation - Equipment/structure

PROBLEM	STRATEGIES	OUTPUT	ACTIVITIES	TARGET GROUP	RESPONSIBLE GROUP	TIME FRAME	RESOURCES	BUDGET (ZMW)	POSSIBLE FUNDERS	EXPECTED CHALLENGES
Unsustainable Natural Resources Management	Holding awareness campaigns in all wards	Awareness campaigns held in every ward	- Mobilise resources - Carry out community mobilisation - Conduct awareness campaigns - Monitoring and evaluation	Community (All Wards)	-Local Authorities -Forestry -NGOs -Ministry of Agriculture	3 Months	- PA System - Food/ refreshment - Transport refunds - Fuel - Drama groups and marchers	300 000	FAO, UNEP, UNDP, World Bank, Africa development banks, international development banks, local authorities	- Change in political environment - Untimely release of resources
	Establish community-based tree nursery in all wards	Community tree nurseries established in every ward	- Mobilise community - Mobilise resources - Secure land - Prepare land - Pot filling and broadcasting - Tendering - Monitoring and evaluation	Community and institutions	- Local authorities - Forestry	4 months	- Polythene pots - Nursery equipment - Nursery sites - Inputs - personnel expertise - Transport	300 000	FAO, UNEP, UNDP, World Bank, Africa development banks, international development banks, local authorities	- Adverse weather patterns - Vandalism - Economic slumps
Use of Agrochemicals	Training farmers in Integrated Pest Management Control (IPMC)	Farmers trained in IPMC	- Mobilise resources - Mobilising identified farmers - Conduct training - Monitoring and evaluation	Farmers in the Copperbelt Region	-MACO -SAPP -ZNFU -NGOs	1 month	- Training materials - Facilitators - Venue - Fuel - Refreshment - Transport	700 000	GRZ, FAO, GIZ, EU, World Bank, World Vision	- Economic slumps

Table continued

PROBLEM	STRATEGIES	OUTPUT	ACTIVITIES	TARGET GROUP	RESPONSIBLE GROUP	TIME FRAME	RESOURCES	BUDGET (ZMW)	POSSIBLE FUNDERS	EXPECTED CHALLENGES
Excessive Land Tillage	Promoting sustainable farming practices	Farmers trained in conservative farming methods such as zero tillage	- Mobilise resources - Conduct training in agro-forestry - Conduct training in conservation farming - Conduct training in land management - Conduct monitoring and evaluation	Farmers in the Copperbelt Region	- MACO - NGO - ZNFU	1 month	- Training materials - Facilitators - Venue - Fuel - Refreshment - Transport	700 000	GRZ, FAO, GIZ, EU, World Bank, World Vision	
Use of Sewage for Irrigation	Enforcing the law	Identified communities sensitised Law enforced in identified communities		- Identified communities in the Copperbelt - Identified farmers	- Water utility companies - Local authorities - MACO - MOH	Ongoing	- Stationery - Personnel - Transport - Fuel - Finances - Food/ Refreshment			
	Setting up irrigation schemes	- Irrigation schemes established in selected areas		Farmers in identified communities in the Copperbelt Region	- Water utility companies - Local authorities - MACO	18 months	- Land - Irrigation engineers - Finances - Labour - Irrigation equipment/ structure			



FAO and RUAF Foundation partnered to support a City Region Food System Assessment and Planning process in seven cities selected from across the globe– Lusaka and Kitwe (Zambia), Colombo (Sri Lanka), Medellín (Colombia), Quito (Ecuador), Toronto (Canada) and Utrecht (The Netherlands). A synthesis report on each city as presented here, describes the experiences from each city in terms of planning and informed deci sion-making, prioritising investments and design of sustainable food policies and strategies to improve the resilience and sustainability of the entire food system.

This entire series of 7 reports will provide a full overview of the experience of those cities, and culminated in a set of tools to support city regions to assess and better plan their food system around the world. For a detailed description of the CRFS assessment process, city examples, tools and project outputs, please visit the FAO Food for the Cities Programme and RUAF CityFoodTools project websites.

ISBN 978-92-5-130865-3

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CA1095EN/1/08.18

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