



# An overview of the Ugandan Food System: Outcomes, Drivers & Activities



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### Authors

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# Table of contents

Key messages .....	4	8	Conclusions.....	48
Abbreviations .....	5	References .....	50	
1	Introduction.....	6		
2	Using a food systems approach.....	8		
3	Context and Geography .....	10		
3.1	Brief context and history .....	10		
3.2	Policy landscape .....	10		
3.3	Climate and ecosystems .....	11		
4	Food system outcomes .....	14		
4.1	Food and nutrition security .....	14		
4.2	Economic and social wellbeing .....	18		
4.3	Environmental outcomes .....	20		
5	Food System Drivers .....	22		
5.1	Demographics .....	22		
5.2	Economic development.....	23		
5.3	Growing market opportunities .....	24		
5.4	Shift in dietary patterns.....	25		
5.5	Science and technology .....	25		
5.6	Climate and environment.....	26		
5.7	(Geo)politics .....	28		
6	Food system structure, actors and activities .....	30		
6.1	Food system activities .....	31		
6.2	Enabling environment .....	36		
7	Food System dynamics .....	40		
7.1	Food security and Nutrition .....	42		
7.2	Socio-economic factors.....	43		
7.3	Environmental factors .....	45		

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# Key messages

Catering to the needs of close to 50 million inhabitants across an area of 241,000 km<sup>2</sup>, the Ugandan food system is largely self-sufficient. However, faces several social, economic and environmental challenges. While levels of stunting, wasting and underweight have declined in recent decades, food insecurity levels are critical in some of Uganda's northern regions. More than half of Uganda's households work in agriculture, but productivity and income levels of the smallholder farmers are low. Although over 90% of Uganda's energy comes from renewables, the use of firewood and charcoal for cooking is a major cause of deforestation, threatening Uganda's rich biodiversity.

With Uganda's population expected to double from 50 to 100 million between now and 2050, the country is facing a major food security challenge. Political instability in neighbouring countries and the influx of refugees put the food system further under pressure. At the same time, dietary preferences are shifting, with home-grown food being increasingly replaced by ultra-processed foods, fast food and sugar sweetened beverages, especially in urban areas.

## Highlights of the Ugandan food system

1. Uganda had a total of 7.4 million agricultural households. Maize, sweet potato, cassava and green banana are the most produced food crops. The main cash crops are coffee, tea and cotton. On average, each household has a landholding area of 1.4 ha and possesses an average of two land parcels.
2. On average, Ugandans spend nearly 50% of their total outgoings on food. This is significantly higher for the low socio-economic classes (57%) than the highest socio-economic class (41%).
3. Uganda is making progress on nutrition targets. Stunting rates dropped from 33% in 2011 to 26% in 2022. Uganda is 'on course' to meet the target on wasting, with 2.9% of children under five years of age being affected; this is much lower than the African region average of 6%.
4. In the northeastern region of Karamoja, 45% of the population face acute food insecurity, due to delayed harvests, and loss of livestock, due to

inadequate rainfall. This has resulted in a sustained period of low food availability, elevated food prices and diminishing purchasing power over the past three years.

5. Due to inadequate infrastructure and subpar post-harvest techniques, Uganda struggles with significant food losses. Efficient food distribution is hindered by inadequate road networks (16% developed) and restricted transport options.
6. Food safety is a key concern in Uganda, with approximately 1.3 million cases of food-related illnesses being reported annually and 14% of all yearly diseases stemming from food contamination.
7. Urbanisation and economic growth have led to more people adopting western diets and eating processed foods. Home-grown plant-based foods are increasingly being replaced by ultra-processed foods and beverages. This shift is associated with overnutrition and related health problems, especially among the middle and higher-class populations.

Climate-related issues, such as droughts, floods and landslides, are occurring more frequently and with greater intensity, leading to major losses of cattle, crop failures and damage to infrastructure. Extreme droughts in vulnerable areas, like Karamoja, Gulu, Kitgum and Kotido, and extreme floods and landslides in the Mount Elgon and Rwenzori regions increase the risks of food insecurity.

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# Abbreviations

<b>ACF</b>	Agricultural Credit Facility
<b>AfCFTA</b>	African Continental Free Trade Area
<b>FAO</b>	Food and Agricultural Organization
<b>FoSTr</b>	Foresight for Food System Transformation
<b>GDP</b>	Gross Domestic Product
<b>GHG</b>	Greenhouse Gas
<b>IFAD</b>	International Fund for Agricultural Development
<b>MAAIF</b>	Ministry of Agricultural, Animal Industry and Fisheries
<b>MSME</b>	Micro, Small and Medium-sized Enterprises
<b>MTIC</b>	Ministry of Trade Industry and Cooperatives
<b>NaCRRRI</b>	National Crops Resources Research Institute
<b>NARO</b>	National Agricultural Research Organisation
<b>NCD</b>	Non-communicable Disease
<b>NFSCC</b>	National Food System Coordination Committee
<b>NGO</b>	Non-governmental Organisation
<b>NPA</b>	National Planning Authority
<b>OPM</b>	Office of the Prime minister
<b>SACCO</b>	Savings and Credit Cooperative Organisation
<b>SDG</b>	Sustainable Development Goal
<b>UAIS</b>	Uganda Agriculture Insurance Scheme
<b>UBoS</b>	Ugandan Bureau of Statistics
<b>UNAP</b>	Uganda Nutrition Action Plan
<b>UNADA</b>	Uganda National Agro-input Dealers' Association
<b>UNDP</b>	United Nations Development Programme
<b>UNFSS</b>	United Nations Food System Summit
<b>WFP</b>	World Food Programme
<b>WHO</b>	World Health Organisation
<b>WUR</b>	Wageningen University & Research

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# 1 Introduction

## **Need for food system transformation**

Uganda, which is known for its rich agricultural heritage and diverse array of food products, finds itself at a crucial crossroads in its food system evolution. Despite favourable climatic conditions conducive to agriculture, the country grapples with pressing socio-economic, nutritional and health challenges, which are exacerbated by rapid population growth. While the agricultural landscape flourishes, inadequate infrastructure hampers market access, leading to uneven food distribution and substantial post-harvest losses. Shifting dietary patterns and stringent export market standards place further strain on the system's capacity, necessitating compliance with strict food safety and traceability standards. In this context, the imperative for a resilient and future-proof food system is paramount, which ensures the equitable provision of safe and nutritious food while fostering economic vitality.

## **Prioritising food system change in Uganda**

The 2021 UN Food Systems Summit (UNFSS) emphasized the urgency of transforming food systems and defining comprehensive pathways for change. These pathways must be put into action at both national and local levels, necessitating substantial improvement in forward-looking engagement processes among policymakers, researchers, and society as a whole.

Following the UNFSS, in Uganda, increased attention was paid and extra momentum given to addressing various challenges within the country's food system. In preparation for the summit, the government developed a food system transformation pathway. Subsequently, the National Food System Coordination Committee (NFSCC) was established under the Office of the Prime Minister to coordinate the implementation of this pathway and the commitments made during the summit and National Food systems Dialogues. The NFSCC, which is mostly composed of governmental bodies involved in the implementation of food and nutrition interventions, is co-chaired by the National Planning Authority and Ministry of Agriculture, Animal Industry and Fisheries. With support from the FAO,

a strategic analysis of the food systems has been conducted, laying the foundations for the development of a Food systems transformation action plan and integrating it into the upcoming fourth National Development Plan. This analysis primarily focuses on human resources, the policy and institutional environment, and finances.

These efforts lay a strong foundation for considering the future of the food system in Uganda from a range of perspectives. This will entail asking questions about food systems. What is the food system expected to deliver in terms of outcomes, not only to enhance national food and nutrition security but also to contribute to socioeconomic development in Uganda? How can be ensured that agricultural development does not exacerbate the degradation of the natural environment? What uncertainties could potentially affect the envisaged pathway, and how will they alter the country's aspirations? The planned foresight and scenario analyses will centre on these matters, engaging diverse stakeholders in clarifying their aspirations and evaluating the plausible impacts of risks and uncertainties. Through foresight analysis, Ugandan policymakers, practitioners, entrepreneurs, producers, and civil society representatives can take preliminary and anticipatory action to prepare the food system for future demands and plausible events.

## **Initiating the Foresight4Food process**

Foresight approaches have been used for quite some time as a structured method to explore critical uncertainties that shape how decisions made today. By adopting a forward-looking perspective, decision-makers can better prepare for future scenarios and challenge underlying assumptions. Integrating insights from current food systems with foresight techniques, the Foresight4Food initiative has devised an approach to facilitate planning for food system transitions. The first step involves developing a comprehensive description of the food system accessible to diverse stakeholders. Through detailed analysis, stakeholders can foster a shared understanding of the food system, enabling informed compromises and strategic decisions, thereby paving the way for a sustainable and resilient future.

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This effort was conducted under the support facility known as 'Foresight for Food System Transformation' (FoSTr), a three-year programme funded by the Kingdom of the Netherlands, overseen by the International Fund for Agricultural Development (IFAD) and implemented by University of Oxford and Wageningen University & Research (WUR) in five countries: Bangladesh, Jordan, Kenya, Niger and Uganda. For Uganda, a research team has been established, which includes researchers from Makerere University, Africa Innovations Institute (AfrII), National Agricultural Research Organisation (NARO), Kyambogo University, Wageningen University and Research (WUR), and Oxford.

The objective of this report is to describe the Ugandan food system in order to provide evidence-based input for a participatory scenario process to support the development of food system transformation in the country. Systems and foresight analyses are crucial to helping stakeholders understand the likely consequences of 'business as usual' and to explore the trade-offs, opportunities, synergies and risks of alternative scenarios and pathways. We aim to build upon other research conducted on the Ugandan food system, including the food system profile developed by FAO (2021) and the Uganda Food Systems Transformation Synthesis paper (Republic of Uganda, 2021).

This report is structured as follows:

- Section 2 outlines the approach and methodology used to describe and analyse the food system. It also describes how this report builds on the concept of food system analysis and its application in the Ugandan context.
- Section 3 provides key insights into the regional context and geography of the Ugandan food system.
- Section 4 describes the key outcomes of the Ugandan food system in terms of food and nutrition security, economic and social wellbeing and environmental sustainability.
- Section 5 provides an overview of the key drivers of the Ugandan food system: demographics, development, consumption, technology, markets, climate, environment, policy and geopolitics. This section also describes the effects of recent shocks, including the COVID-19 pandemic and the war in Ukraine.
- Section 6 presents an overview of key actors in the Ugandan food system, their activities and the context in which they operate.

- Section 7 describes the dynamics between the various elements in the Ugandan food system using causal loop diagrams, focussing on various issues under the domain of socio-economic factors, food security and nutrition, and the environment.
- Section 8 provides a summary of the findings.

### Disclaimer

This report uses data from both national and global sources. It is important to acknowledge that we have prioritised national statistics whenever they are accessible. We understand that national and global datasets may not always coincide, thus requiring continuous iterations to obtain accurate and up-to-date data. This report was created as the initial iteration of a living document, with the intention of regular updates as additional data become available.

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## 2 Using a food systems approach

To map the key components of the Ugandan food system, we adopted the Foresight4Food food system framework (Figure 1, below). This framework builds on previous work and incorporates elements of the food systems framework developed by Ingram (2011), HLPE (2016) and van Berkum et al. (2018). We use this framework as a basis for describing the food system while customising specific elements to the Ugandan context. We also use it to scan for trends relating to the food system and to detect major drivers behind it. This framework describes the main components of a food system: activities, support systems, drivers and outcomes.

Food systems are formed by a core set of activities. These activities are performed by a range of actors. They include primary production, processing, retail, consumption, storage and disposal. Given that, in reality, food systems involve multiple interacting value chains, their proper functioning requires a broad set of support services, including physical and market infrastructure, transport, financial services, information and technology.

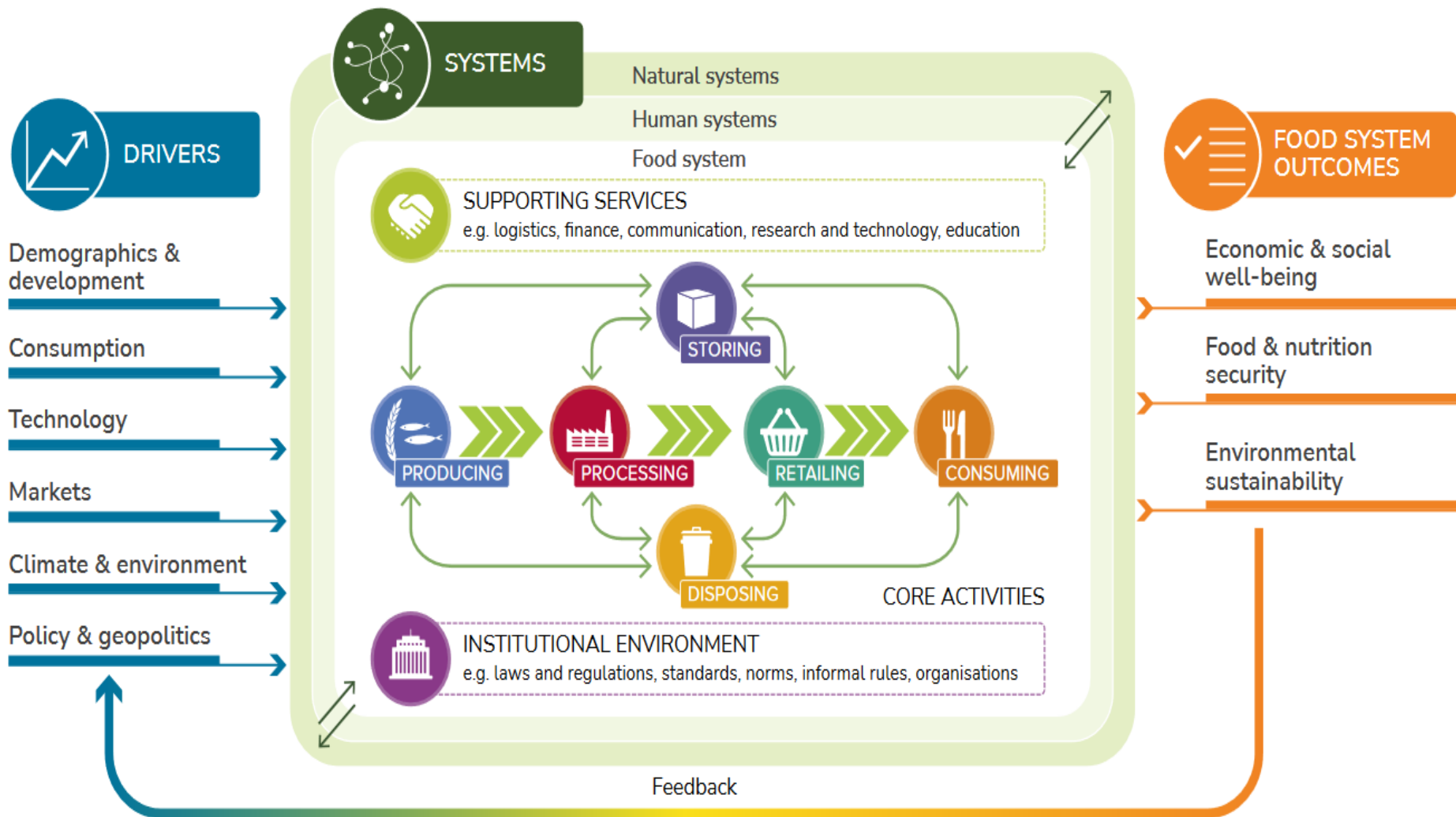
The incentives and operating conditions for the actors are influenced by the institutional environment of policies, rules and regulations, consumer preferences and social norms. These institutions create the formal and informal rules that key actors apply to govern food systems.

The food system operates within the wider context of society, which also includes human and natural systems, with multiple interactions and feedback loops between these systems. These wider systems create a set of external drivers and trends that shape the behaviour and evolution of food systems as a whole. At the same time, each system actor influences, is influenced and reacts accordingly. The drivers of food systems include population dynamics, consumption preferences, technological developments, global markets, environmental factors and politics. Food system outcomes can be categorised into three main areas:

economic and social wellbeing, food and nutrition security, and outcomes relating to nature and the environment.

Food systems models provide the basis for understanding and exploring the critical relations, trends and trade-offs that support the desired system transformation aimed at generating higher levels of desired outcomes. For example, indicators of the three outcomes enable the assessment of whether food systems function in desirable or undesirable ways in light of wider societal and environmental objectives. Analysing the drivers that fuel the current state of the food system promotes an understanding of the pressures exerted on food systems. These drivers not only influence the outcomes but are also influenced by them, forming various feedback loops.





**Figure 1** The Foresight4Food food systems framework

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# 3 Context and Geography

This section provides a comprehensive overview of Uganda's history, political landscape, geography and ecosystem, with the aim of illustrating the contextual factors that influence its food system.

## 3.1 Brief context and history

Uganda is a landlocked country in East Africa with an area of 236,000 km<sup>2</sup>, bordered by Kenya, South Sudan, DRC Congo, Rwanda and Tanzania (Russel, 2016). As of 2022, it had an estimated population of over 47 million people (World Bank, 2023g). Similar to other sub-Saharan countries, the population of Uganda is relatively young. In 2022, 45% of the population was 0 to 14 years old. Pre-colonial Uganda was characterised by various powerful kingdoms and chiefdoms, each boasting unique cultural and political systems. The formal political authority of these entities waned when Uganda became a British protectorate in the late 19<sup>th</sup> century. Nonetheless, their imprints resonate in Uganda's diverse cultural scenery, exemplified by numerous ethnic groups, each preserving its distinct traditions, languages and customs.

English and Swahili are the country's official languages, reflecting the historical aftereffects of British influence. The British introduced a new political structure and fostered Christianity, which left a lasting impact on the country's cultural and social landscape. Uganda gained independence in 1962. Subsequent years witnessed a period of instability, characterised by political tensions, military coups and a repressive regime in the 1970s, a period of political stability followed characterised by economic reforms and promotion of social development. However, over the past decade, concerns have emerged about the increasing concentration of power, suppression of political opposition and the erosion of democratic institutions (Dhizaala, 2021).

## 3.2 Policy landscape

As part of the preparations for the UN Food Systems Summit (UNFSS) in 2021, Uganda organised several national dialogues to collaboratively identify the major challenges related to sustainable and equitable food systems the country faced (Government of Uganda, 2021). In the concluding statements, the Minister of Agriculture, Animal Industry and Fisheries reaffirmed the Ugandan government's commitment to translating the outcomes of the UNFSS into tangible actions through strategic and expedited decisions. One of these immediate decisions was to develop Uganda's food system transformation pathways based on the discussions that took place during the summit. The food system action tracks are aligned with the 2013 version of the vision document 'Uganda's Vision 2040', which outlines strategies to overcome various bottlenecks that have hindered the country's socio-economic development, including challenges in the private sector, inadequate infrastructure and an underdeveloped agricultural sector (National Planning Authority Uganda & Government of Uganda, 2013). Furthermore, the National Development Plan 2020-2025 outlines various objectives related to the Ugandan food system, including agricultural sector commercialization, reducing reliance on subsistence farming, improving the trade balance, and enhancing household food security. In addition, there are various sectoral policies which focus on a specific part of the food system. The commitment to advancing agricultural sector's development to deliver the food systems outcomes is further elaborated in the national agricultural policy (Ministry of Agriculture, Animal Industry and Fisheries, 2013) and the agricultural sector strategic plan 2015-2020, which is centred around 12 commodities (Ministry of Agriculture, Animal Industry and Fisheries, 2016). The Ugandan Nutrition Action Plan II (2020-2025) sets concrete targets to address the triple burden of malnutrition, including stunting, wasting, micronutrient deficiencies such as anaemia, and diseases related to overnutrition like high blood pressure, diabetes, and obesity (Office of the Prime Minister, 2020).

### 3.3 Climate and ecosystems

Uganda has a tropical climate characterised by varying temperature and rainfall affected by physical factors such as altitude, wind, and the presence of rivers and lakes. On average, annual temperatures range from 24 to 31°C, and annual precipitation ranges from 400 to 1,600 mm (World Bank, 2021a). This varying climate, alongside other geographical characters, creates biomes across Uganda's terrestrial and aquatic environments, which boast an exceptional wealth of biodiversity. The country is home to over 50% of Africa's bird species and 39% of the continent's mammals (Convention of Biodiversity, 2023). Uganda's landscape is also a tapestry of rare and indigenous vegetation. With 722 officially designated protected areas, the country places a strong emphasis on preserving its unique ecosystems and wildlife. Additionally, 45 areas are classified as key biodiversity areas, meaning they conserve significant numbers of at least one species under threat, and they play an important role in the conservation of these species on a global scale (Plumptre et al., 2017).

#### 3.3.1 Climatic zones

Uganda's climatic zones can be broadly categorised into four main regions, each with distinct weather patterns and ecological characteristics (World Atlas, 2023).

1. *The equatorial zone* covers the central part of Uganda, including the capital city Kampala. This region has a tropical rainforest climate with consistent temperatures throughout the year. Temperatures generally range from 20–30°C. Rainfall is abundant and evenly distributed, with two wet seasons from March to May and September to November.
2. *The savannah zone* covers the northern region of Uganda. This area has a tropical savannah climate with distinct wet and dry seasons. The wet season lasts from April to October when temperatures drop to 26–27°C. The dry season lasts from November to March, when temperatures rise to 32°C. The vegetation in this zone is characterised by savannah grasslands and acacia woodlands.
3. *The highland zone* covers the southwest and western regions of Uganda, including the Rwenzori Mountains and Kigezi Highlands. This region has a cooler climate due to the higher altitudes. Annual average temperatures are generally moderate, but the rainfall is more variable compared to the other zones, with two rainy seasons from March to May and September to

November. The highland zone supports diverse vegetation, including montane forests and bamboo. The Rwenzori Range is home to permanent ice caps. Nevertheless, with the ongoing rise in temperatures, these ice caps are forecasted to vanish by the 2040s. This development has significant implications for the region's water resources, livelihood activities and downstream agriculture, and it is expected to alter the zone's epidemiological profile.

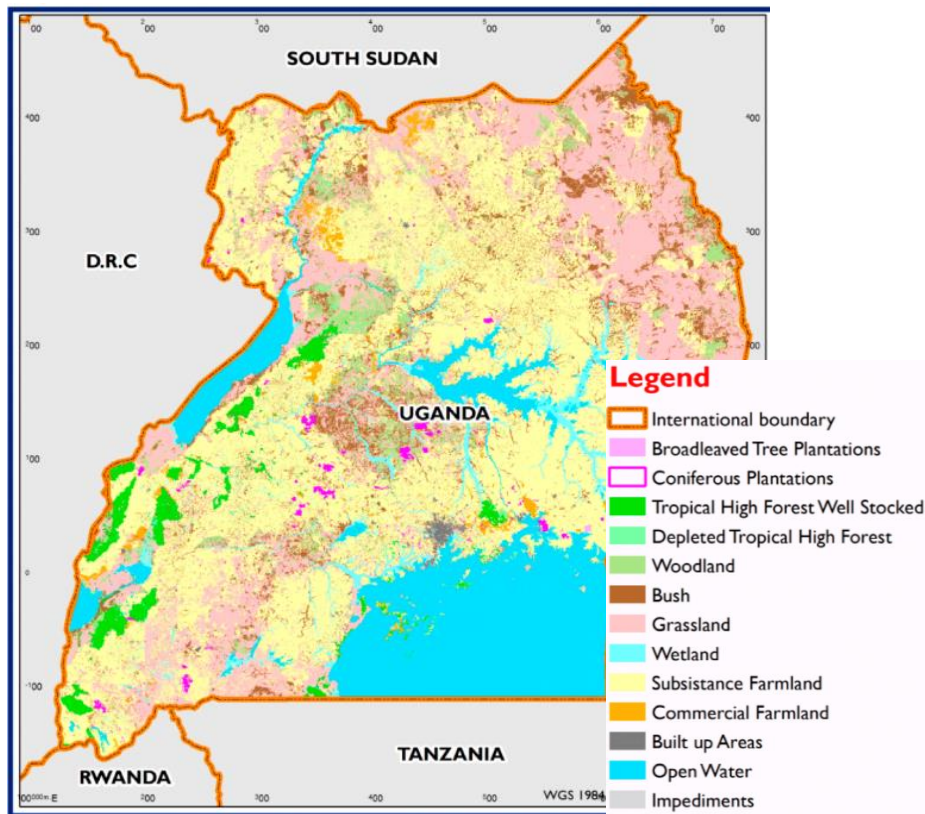
4. *The semi-arid zone* covers the north-east and Karamoja regions of Uganda. This area has a semi-arid climate, limited rainfall and higher temperatures. The wet season is relatively short, taking place between April and September, while the dry season lasts from October to March. The semi-arid zone is characterised by dry grasslands and shrublands.

#### 3.3.2 Geographical features and land use

Uganda lies on the East African plateau and has an average elevation of approximately 1,100 metres above sea level. The terrain gradually slopes downward to the Sudanese plain in the north. High mountain peaks adorn the landscape, with the highest peak reaching 5,100 metres. Uganda's landscape is diverse with its fertile highlands, savannahs, wetlands and mountainous regions. The southern and western highlands have fertile volcanic soils, which are ideal for crop cultivation. In contrast, some northern and eastern regions have sandy soil, are challenging for agriculture.

With nearly 7 million hectares of arable land, Uganda's arable area covers 34% of the total land area, surpassing the sub-Saharan Africa average of 9.3% (World Bank, 2020). Between 1970 and 2020, the percentage of the total land area used for agricultural activities increased substantially, rising from nearly 50% in 1970 to 72% in 2020 (World Bank, 2023b). FAO reports indicate that, between 1990 and 2020, the coverage of land by forests declined by 34% (World Bank & FAO, 2023).





**Figure 2** Land use in Uganda in 2015  
 Source Mwanjalolo et al., 2018.

### 3.3.3 Land regulations

According to Uganda’s Land Act 1998, four land tenure systems are recognised: freehold, leasehold, customary and Mailo (Land Portal, 2021). These systems offer varying levels of tenure security and land rights. Freehold tenure refers to a registered and permanent interest in land, and it provides the highest level of individual ownership. However, only 18% of the land in Uganda falls under this tenure system, mainly in the western part of the country. Around 9% of the country’s land is under the Mailo tenure system, and it is predominantly found in the central region of the country. Unlike the freehold system, the Mailo tenure

system permits the separation of land ownership from the ownership of developments made on it. Under this arrangement, the land belongs to a landlord, while tenants are legally recognised, and they hold the rights to live on and utilise the land. Leasehold tenure is defined as a situation in which one party grants another the exclusive right to possess the land for a specific period, usually under a tenancy contract. This system is mainly employed when land is owned by government bodies and entails specific development conditions in the lease. The customary tenure system is the predominant system in Uganda especially in the eastern and northern regions, encompassing over 80% of the country’s land (Land Portal, 2021). In this system, access to land is governed by community rules, customs and regulations. However, due to the lack of documented land rights and transactions, the customary tenure system often gives rise to conflicts, affecting investment opportunities and diminishing agricultural performance. Marginalised groups are particularly affected by this lack of documentation on their legal land rights, making them vulnerable as it renders local communities susceptible to land grabbing activities (Ashukem, 2020).

### 3.3.4 Water resources and withdrawal

Uganda is blessed with abundant water resources, encompassing both surface and ground water. Land covered by water bodies (streams, rivers, lakes and wetlands) and swamp land makes up 17% of the total surface area of the country (World Bank, 2021a). There are eight river basins in the country, but most of the country falls in the upper Nile catchment, with numerous rivers and streams that flow into major lakes, like Victoria, Kyoga, Edward and Albert, and eventually into the river Nile. Lake Victoria, the largest lake in Uganda, mainly replenishes its water levels through precipitation (82%).

Uganda’s wetlands play a vital role in both urban and rural areas, providing a range of ecosystem services. They are utilised for farming, fishing and livestock grazing, and they serve as a primary water source for many rural households. Moreover, the wetlands contribute to regional water quality regulation by filtering pollutants and controlling water flow. Unfortunately, the coverage of wetlands in Uganda has been declining, from 15.6% in 1994 to 10.9% in 2008 (World Bank, 2021a). This deterioration is attributed to extensive wetland degradation caused by activities like rice cultivation, dairy farming and flower farming along the shores of Lake Victoria.

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Uganda has more than enough freshwater for its population. Water withdrawals for supply is with 5.83%, well below the threshold for water stress (withdrawal less than 25% of resources) used in the SDGs (USAID & Sustainable Water Partnership, 2021). However, water resources are unevenly distributed, poorly regulated and increasingly exploited due to increasing population growth, urbanisation, agricultural production and industrialisation. These factors have led to water scarcity in multiple regions. Water stress is particularly high in Karamoja, which hosts 20% of the country's cattle (USAID & Sustainable Water Partnership, 2021). Of the total population of Uganda, 21 million individuals (accounting for 51% of the population) do not have access to safe drinking water, and they rely on communally owned surface water sources, like streams, ponds and unprotected hand-dug wells, for their daily needs (Lifewater International, 2020). Another 32% of the population faces limited access to safe water, which means they have to spend over 30 minutes fetching water from long distances or waiting due to overcrowding.

## 4 Food system outcomes

In order to assess the present status of the country's food system, it is important to review the food system outcomes explained in Chapter 2. Food system outcomes encompass three primary areas: ensuring food security and optimal nutrition for all; meeting socio-economic goals, in particular reducing poverty and inequality, and enabling food production within environmental limits. This chapter provides an overview of the status of Ugandan food system outcomes.

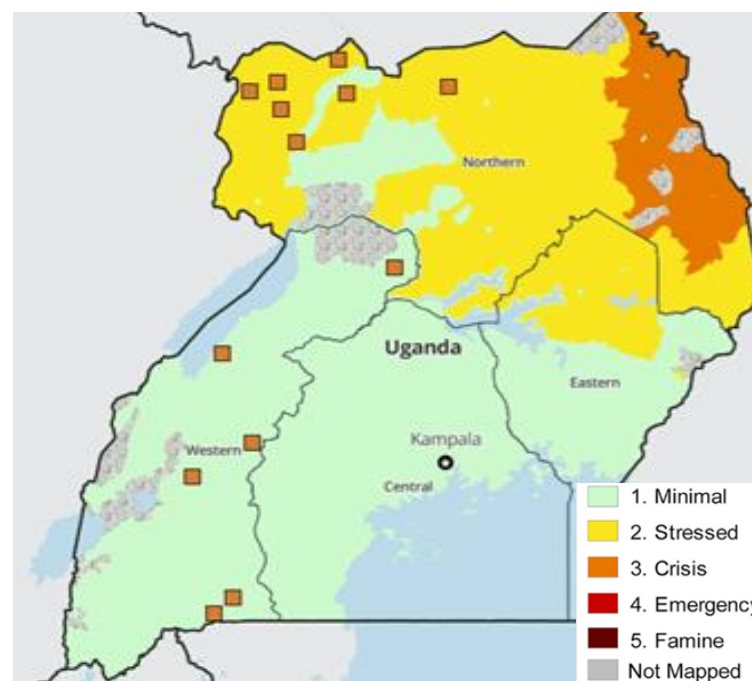
### 4.1 Food and nutrition security

Food security levels vary significantly between regions (Figure 3). According to the Integrated Food Security Phase Classification report, the Northern part of the country faces acute food insecurity (IPC, 2023). Importantly, the Karamoja region in the northeast is currently grappling with a crisis, with 45% of the population facing acute food insecurity. This predicament is attributed to delayed harvests and loss of livestock due to inadequate rainfall, and it has resulted in a sustained period of low food availability, elevated food prices and diminishing purchasing power that has lasted three years (USAID, 2023). Within Karamoja, 8% of the population falls in the emergency food insecurity phase, indicating extreme food shortages, where people face acute malnutrition and a rapidly significantly higher risk of hunger-related fatalities, and disease levels are excessively high (IPC, 2023). Additionally, in refugee settlements primarily situated along the border with Sudan, a food security crisis has affected more than 470,000 people since 2022 (IPC, 2022).

#### 4.1.1 Food availability

Despite the fact that Uganda is largely self-sufficient in food resources, food shortages still occur. In 2018, the average dietary energy supply was estimated at 2,083 Kcals per capita (Uganda Bureau of Statistics, 2020). Since the emergency threshold is set at 2,100 kcal per capita, this estimate indicates that

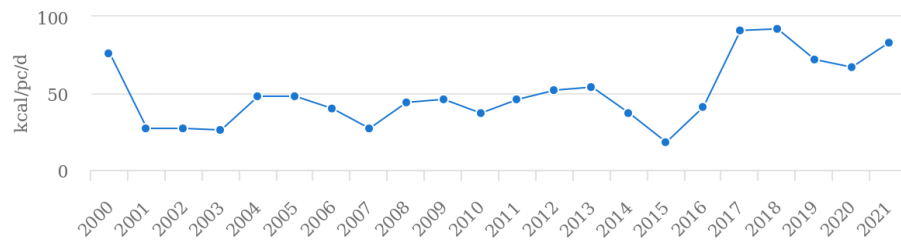
there is insufficient food available to feed the entire population at the national level. The per capita food supply has steadily increased over the past eight years, with a small dip in 2019 and 2020. (Figure 4). This could be attributed to crop failures in those years because of extreme weather events.



**Figure 3** Levels of food insecurity across Uganda

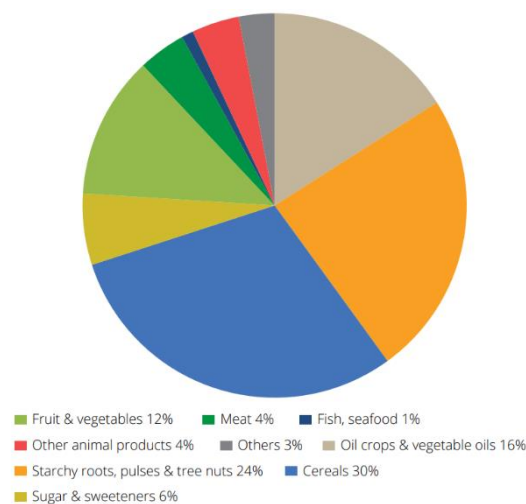
Source: USAID (2023).





**Figure 4** Per capita food supply variability (kcal/cap/day)  
Source: FAO (2023).

Figure 5 shows that most available energy is found in cereals, followed by starchy roots, pulses and tree nuts.

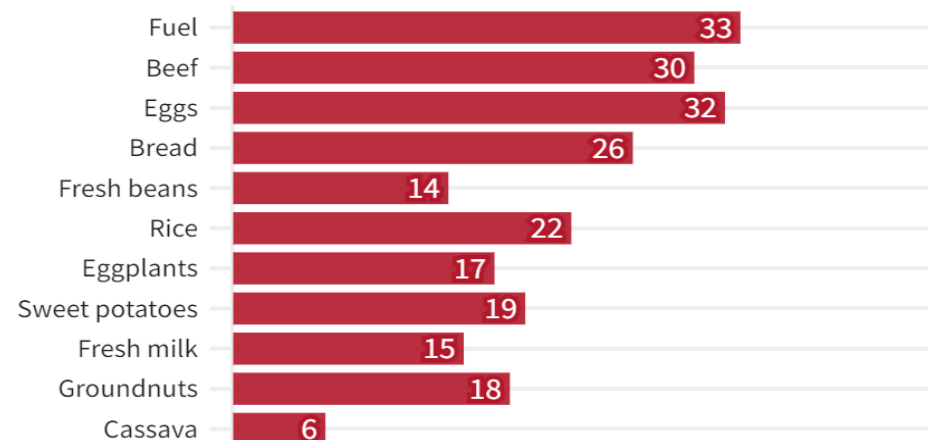


**Figure 5** Availability of food commodities based on Kcal content in 2021  
Source: figure copied from FAO et al. (2023), based on FAOSTAT 2021.

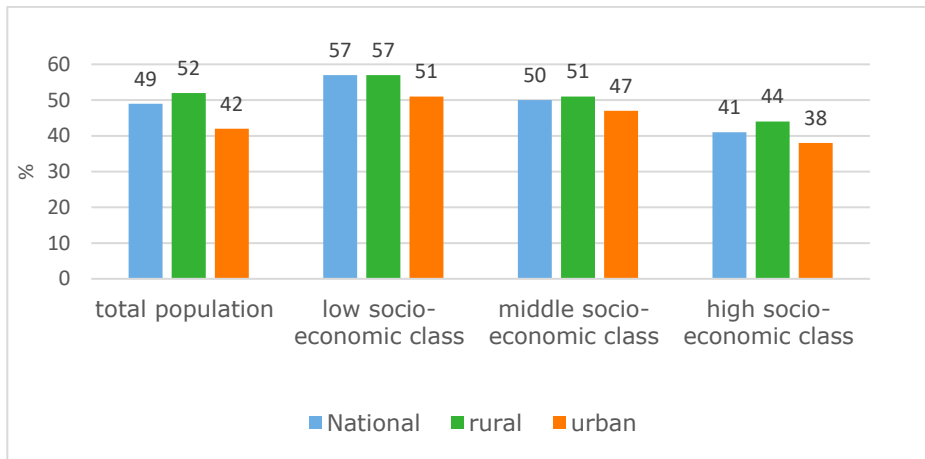
#### 4.1.2 Accessibility

Food accessibility is determined by various factors like income levels, availability of food outlets, transportation infrastructure and geographical location (FAO, 2021). Due to limited storage capacity for fresh foods, availability and affordability fluctuate significantly between seasons. Figure 6 shows the percentage of the population that had no access to essential goods between June to August 2022. The findings indicate that Ugandan households faced significant difficulties in accessing products like beef, bread, rice and cooking oil (World Bank, 2022).

On average, Ugandans spend nearly 50% of their total expenditure on food (Dolislager et al., 2022). This average is notably higher for the low socio-economic classes (57%) compared to the highest socio-economic class (41%). Similarly, for rural residents, the proportion is 52%, surpassing urban areas where people spend 42% of their total expenditure on food. While the income disparity between urban and rural areas may contribute to this variation, Figure 7 illustrates that this distinction persists even when comparing individuals from the same socio-economic group. This suggests that dietary choices may play a significant role in food expenditure.



**Figure 6** Percentage of population unable to access key products (June/July 2022)  
Source: World Bank (2022).

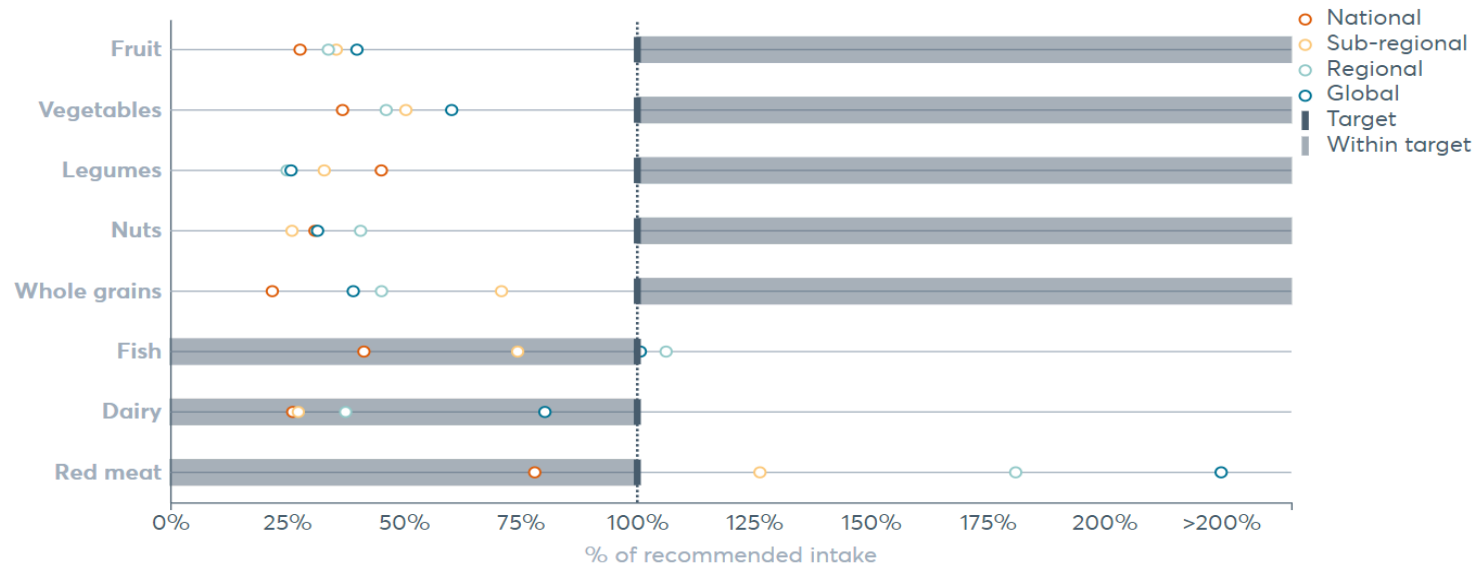


**Figure 7** Share of total expenditure spent on food, segmented for rural and urban areas, for three levels of socio-economic classes  
 Source: own compilation based on data from Dolislager et al. (2022).

### 4.1.3 Food utilisation

The conventional Ugandan diet consists of high carbohydrate meals with predominantly plant-based sources of protein. These diets are often considered deficient in essential micronutrients (Ngaruiya et al., 2017; UBOS et al., 2017). However, Uganda is currently undergoing a shift in dietary patterns towards a more 'westernised' diet. This is explained further in Chapter 5.4. Western diets are characterised by a high intake of animal-based products and ultra-processed foods, like fast food and sugar-sweetened beverages. This leads to an increased intake of salt, fat and sugar.

Figure 8 shows the extent to which current consumption patterns are in line with the recommended intake (Global report of nutrition, 2023) and how Ugandan consumption (orange dot) differs from consumption patterns in other countries. Despite the fact that the Ugandan diet is mainly plant-based, the actual intake is below the recommended intake for all healthy plant-based food groups (grey bar indicates within target).



**Figure 8** Dietary intakes of key foods in adults 20 years and older compared to minimum and maximum targets  
 Source: Global Nutrition Report (2022).

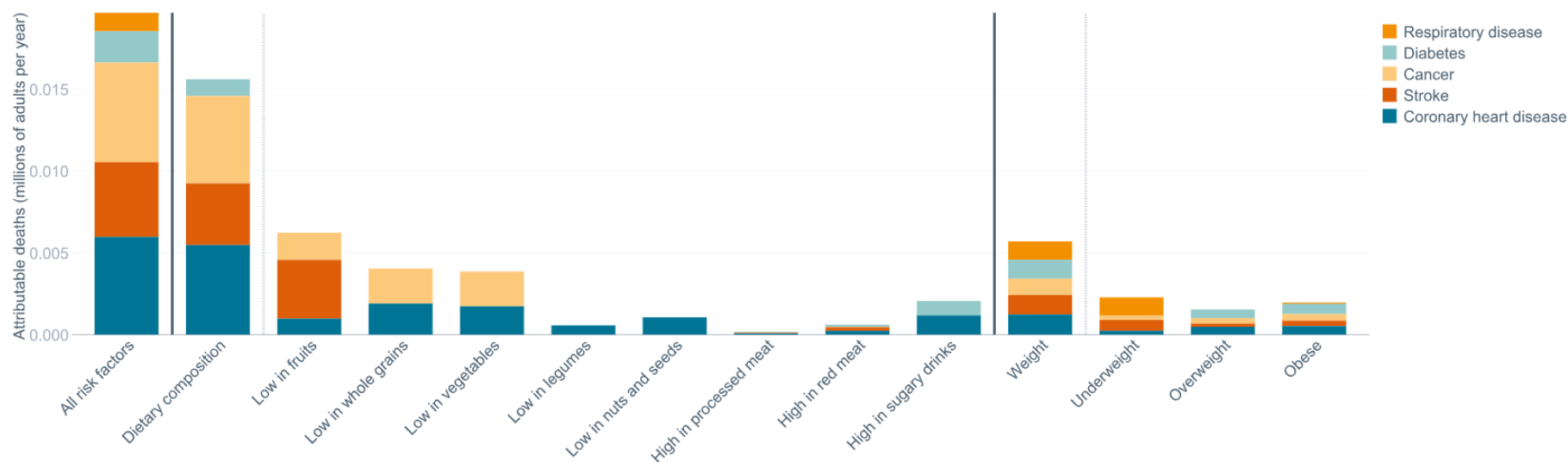
The intake of fruit and vegetables is far below the recommended intake of 200 and 300 grams, respectively, and lower compared to neighbouring countries. For legumes, Uganda performs better than neighbouring countries and the global average. However, at 45 grams, intake is still far below the recommended daily intake of 100 grams. Despite the high intake of cereals, the consumption of wholegrains remains below recommended levels. According to Figure 8, the consumption of fish, dairy and red meat is on target. However, only a maximum target is given for these food groups, and since the intake of legumes and nuts is also low, a considerable portion of the Ugandan population has an insufficient protein intake (Global Nutrition Report, 2022).

#### 4.1.4 Nutritional outcomes

Over the past decade, Uganda has made notable progress towards achieving several global WHO nutrition targets pertaining to maternal, infant and young child nutrition. Stunting rates, for instance, dropped from 33% in 2011 to 26% in 2022 (Global Nutrition Report, 2022). The country is deemed to be 'on course' in terms of meeting the target for wasting diseases eradication, with 2.9% of

children under five years of age being affected, lower than the African region average of 6%.

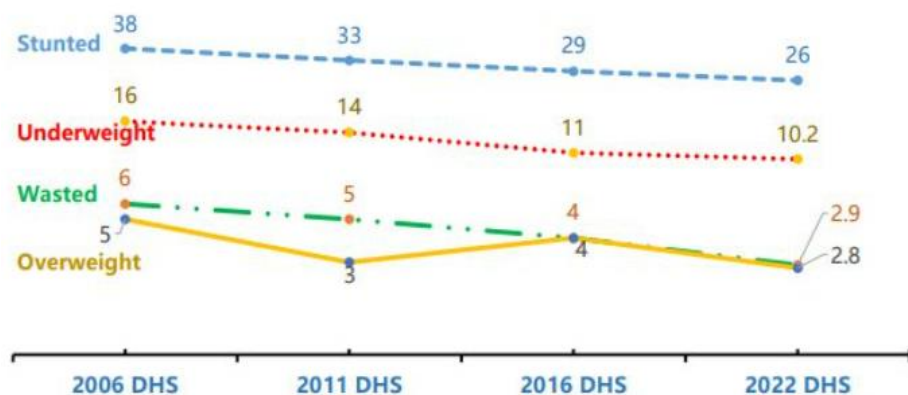
Despite these improvements, malnutrition still poses a severe threat to the wellbeing of children in Uganda, putting the health of an entire generation at risk. Over 1.8 million young children suffer from stunting, a condition that has irreversible consequences (UNICEF et al., 2023). Factors like recurring childhood infections such as diarrhoea, inadequate breastfeeding rates and limited resources and knowledge among families contribute to both wasting and stunting. Among children under five years of age in Uganda, anaemia levels declined from 73% in 2006 to 50% in 2011, but then increased to 53% by 2016 (Nankinga et al., 2019). Similarly, among women aged 15-49, there was a sharp decrease from 49% in 2006 to 23% in 2011, followed by an increase to 32% in 2016. Anaemia prevalence was highest among children and women in the poorest households and lowest in the wealthiest households across all survey years. The prevalence of underweight conditions in adults were estimated at 12.3% for men and 10.1% for women in 2016 (UBOS et al., 2017).



**Figure 9** Mortality attributable to dietary composition and weight  
Source: Global Nutrition Report (2022).



Work on eradicating diet-related non-communicable diseases (NCDs) has been very challenging given that people’s food choices and attitudes are the primary drivers. In 2016, overweight and obesity affected 24% of women and 9% of men aged between 15 and 49 (UBOS et al., 2017). Compared to the 2016 UDHS report, the 2022 UDHS report showed a growing trend of overweight and obesity among females (26%) and males (11%) aged 15–49 (Figure 10) (UBOS, 2023b). Among children under five years of age, the prevalence of overweight was estimated between 2.9% and 3.5% in 2022 (Global Nutrition Report, 2022; UNICEF et al., 2023). Diabetes is estimated to affect 5.6% of adult women and men (Global Nutrition Report, 2022). Figure 9 shows the estimated deaths in Uganda attributable to dietary risk factors by cause of death, for risks related to dietary composition and weight levels indicating that the low consumption of fruits in particular causes higher risks of NCDs like cancer, strokes and coronary heart diseases.



**Figure 10** Prevalence of malnutrition among children aged 6–59 months  
Source: (UBOS, 2023b).

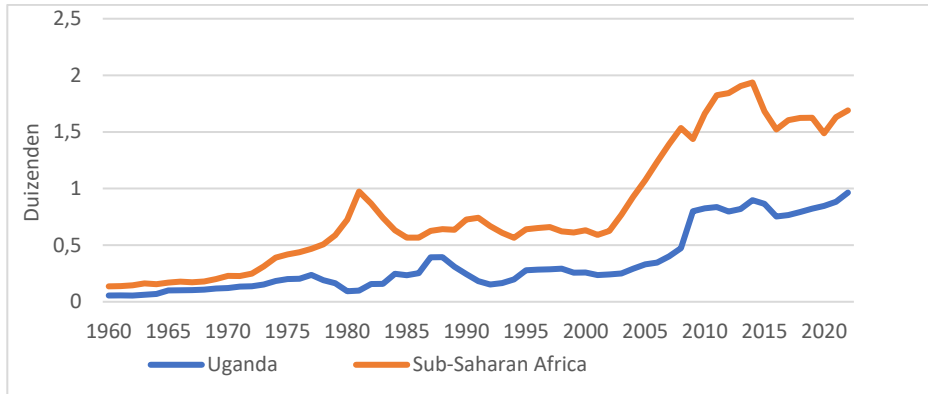
### Food safety

Experts have highlighted that Uganda’s food safety management system is insufficient, which has led to individuals being exposed to unsafe foods (EPRC, 2022). This food carries harmful elements like bacteria, viruses and parasites, or it perpetuates cycles of illness and malnutrition, significantly affecting infants,

young children, the elderly and those with existing health issues. In 2019, Uganda’s Ministry of Health reported an average of approximately 1.3 million cases of food-related illnesses annually, with 14% of these diseases stemming from food contamination (Ministry of Health, 2020). Gastrointestinal disorders represent the most prevalent form of food-borne illnesses, primarily linked to undercooked meat, eggs, fish, fresh produce and dairy products (EPRC, 2022). Aflatoxin contamination in Uganda poses a significant threat to public health and food security, primarily affecting maize and groundnut crops. The presence of aflatoxins in these staples contributes to health issues, such as liver cancer and stunting, while also causing economic losses due to rejected exports and reduced market values. The country has lost 577 million USD annually as a result of around 3,700 aflatoxin-induced liver cancer cases (Lee et al., 2022).

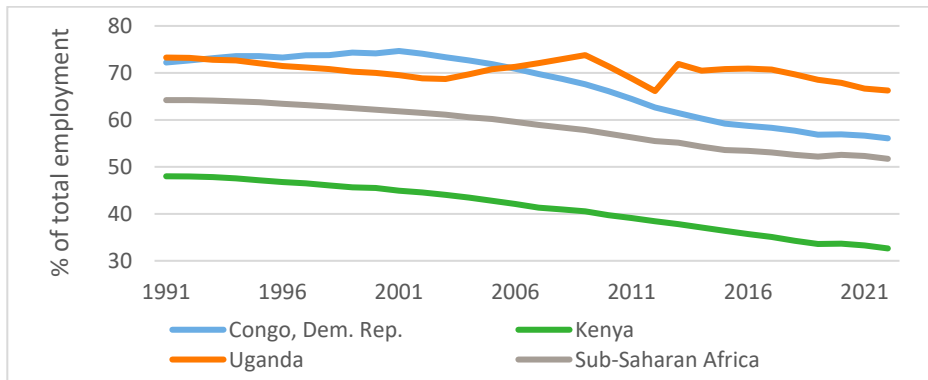
## 4.2 Economic and social wellbeing

In the past decade, Ugandans have made promising economic advancements. Relative peace and improved economic policies have led to substantial growth in the manufacturing sector, service sector and parts of the agricultural sector. According to the World Bank records, Uganda has maintained consistent GDP growth since 1985 (World Bank, 2023d). The Gross Domestic Product (GDP) grew by 5.2% during the 2022/23 Fiscal Year (FY) compared to the revised growth of 4.6% registered in the 2021/2022 FY (UBOS, 2023a). Even in 2021, when most sub-Saharan countries’ GDP growth was negative due to COVID-19 and the Ukrainian War, Uganda still maintained a growth rate of 3%. Despite this economic growth, challenges surrounding abject poverty, poor health, physical insecurity and recurrent food shortages still persist. Over the past three decades, Uganda’s national poverty rate has fallen by more than half, from 56% in the 1992/1993 FY to 20.3% in the 2019/2020 FY, mostly owing to improved agricultural incomes amongst poor households (UBOS, 2022). Despite this, Uganda remains one of the poorest countries in the world. The COVID-19 pandemic aggravated the challenges surrounding poverty.



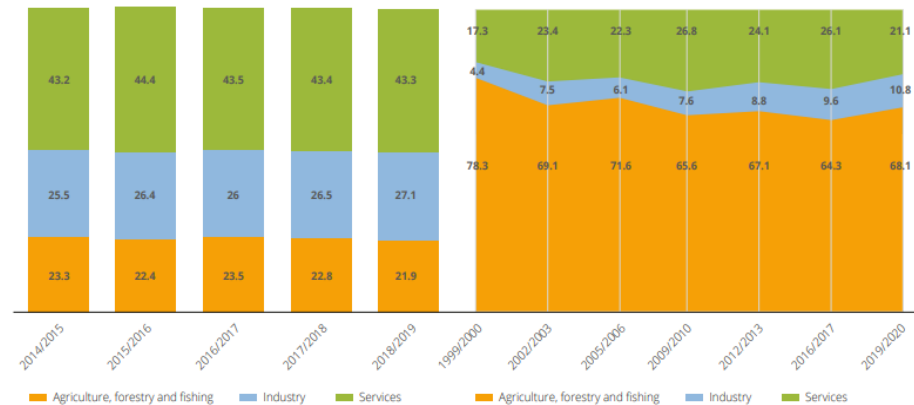
**Figure 11** GDP per capita in USD  
 Source: Own compilation, based on World Bank (2023).

Agriculture only accounts for approximately 22% of Uganda’s GDP, yet it employs a significant proportion of the country’s total workforce (68%) (UBOS, 2020). The share of people working in agriculture is declining, but it is still higher than the average rates in sub-Saharan Africa and compared to neighbouring countries (Figure 12).



**Figure 12** Employment in agriculture (percentage of total employment)  
 Source: own compilation, based on World Bank (2023c).

As depicted in Figure 13a, the contribution the agriculture sector makes to GDP has declined, unlike the contributions made by the industry and services sectors. This is primarily due to the high prevalence of subsistence farming, further explained in section 6.1. (FAO, European Union, et al., 2023). Nearly three-quarters of Ugandans earn a living from agriculture (Magunda, 2020). Many small-scale farmers still live below the national poverty line. Most smallholder farmers still struggle to meet their households’ food needs, which prevents many from going on to participate in markets (Mwesigye, 2017). The challenges that smallholder farmers face are symptomatic of the stagnation that the entire agricultural sector in the country has faced over the years, despite the many initiatives that the government has come up with to boost production and incomes (Dhillon & Moncur, 2023).



**Figure 13** A) Shares of GDP of different sectors; B) Workforce (% employment) by sector  
 Source: FAO (2023), based on UBOS (2019).

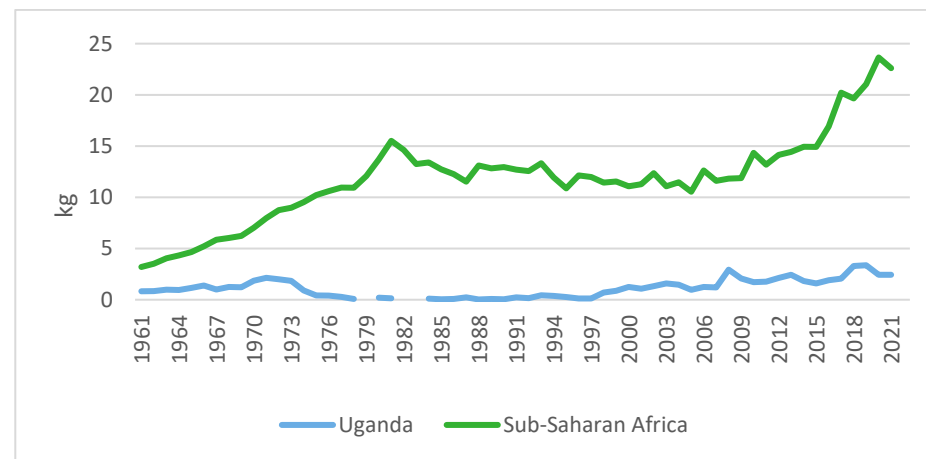
In recent years, the high government debt burden has become a pressing concern for Uganda. External debt increased from 12.39 USD billion in the 2020/21 FY to 12.82 billion USD in the 2021/22 FY, while domestic debt increased from 7.16 billion USD to 8.16 billion USD over the same period (Chidumayo & Gumbo, 2013). Uganda’s growing debt burden poses a threat to food security as it diverts financial resources away from critical agricultural investments. High debt servicing

costs limit the government’s ability to allocate funds for agricultural development, including infrastructure, research, and extension services. Consequently, farmers, especially smallholders, face challenges in accessing advanced technology and inputs, resulting in reduced productivity and food shortages. Moreover, mounting debt makes it more challenging to respond to threats related to climate change, affecting crop yields. The present scenario is very critical as Uganda’s debt crisis not only strains its economy but also undermines its ability to ensure a stable and food-secure future for its citizens.

### 4.3 Environmental outcomes

Climate change and other environmental concerns put high pressure on the Ugandan food system. However, the food system itself is also a major contributor to environmental degradation in the country, for example through land degradation, deforestation and loss of biodiversity.

In 2020, Uganda produced nearly 40 million tonnes of CO<sub>2</sub> equivalent (World Bank, 2023). Cumulatively, agriculture, forestry and other land use sectors are accountable for 86.4% of the total emissions (Byakagaba & Naturind, 2020). Multiple agricultural activities produce greenhouse gasses, including livestock production, rice production and agricultural waste burning. The livestock sector is a major contributor to total GHG emissions. The cattle and poultry generate around 14 million tonnes of CO<sub>2</sub> equivalent per year (FAO, 2018). The cattle sector in Uganda is characterised by a grazing farming system that predominantly relies on grass as the primary feed resource. This is particularly evident in the cattle corridor, which houses most of the national cattle population and 60% of the small ruminant herds. The dairy sector faces challenges from poor feed quality and domestic breeds with low milk yields, which leads to higher GHG emissions compared to neighbouring countries like Rwanda (Kiggundu et al., 2019). Moreover, the use of synthetic fertilisers, in particular nitrogen-based fertilisers, contributes to emissions of methane, carbon dioxide, ammonia and nitrogen. Figure 14 shows that the total amount of fertiliser applied in Uganda has increased in recent years, however, fertiliser use per hectare of arable land remains below the sub-Saharan Africa average (FAO, 2023).



**Figure 14** Fertiliser consumption in kg per hectare of arable land  
Source: own compilation, based on FAO (2023).

The growing population and increased food demand exert great pressure on land and resources in Uganda. Nearly half of the country’s land area is at severe risk of land degradation, primarily driven by unsustainable land-use practices that result in soil erosion and nutrient depletion. Other environmental degradation activities like deforestation also contribute to overall environmental degradation and reductions in ecosystem services that support the food system. The loss of about three million hectares of forest and a 30% decline in wetland area over the past 25 years pose a severe threat to the country’s rich biodiversity (FAO, European Union, et al., 2023).

The adverse impact on biodiversity is most pronounced among rural communities, smallholder farmers and pastoralists who contribute to biodiversity loss through activities such as land conversion for agriculture, improper farming practices and illegal wood collection for energy (WWF, 2021). The Biodiversity Habitat Index for Uganda was 0.538 in 2015. Between 2005 and 2015, the index changed at an annual rate of -0.056% (BIP, 2020). This decline in biodiversity continues to decrease because land conversion for agriculture extend beyond terrestrial ecosystems, affecting aquatic ecosystems through processes like eutrophication and the accumulation of sediment. Industrial-scale agricultural operations, such as production of tea, sugar and palm oil production, further exacerbate the

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situation, particularly in areas designated as key biodiversity zones that safeguard crucial species populations. For instance, the introduction of oil palm plantations on Kalangala island in Lake Victoria led to widescale agriculture characterised by deforestation. The replacement of natural forests with oil-palm trees that rely on the intensive use of chemical fertilisers has led to extensive soil erosion and surface runoff, which has led to eutrophication and the proliferation of water hyacinths (Namaganda, 2018). Despite regulations that govern crucial areas designated for biodiversity protection, breaches of these 'protected areas' by agriculturists pose a threat to these ecosystems. A notable incident occurred in 2019 when a part of the Bugoma Central Forest Reserve, home to endangered chimpanzees, was cleared for sugar production (Okiror, 2021).

The decline in biodiversity abundance also depreciates the provisional and cultural ecosystem services that it sustains. A significant portion of Uganda's economy relies on ecosystem services, encompassing sectors like fisheries, agriculture, tourism and subsistence use of medicinal plants (Biofin, 2021). Within the fishing sector, the consequences are evident in the reduction of fish catches, primarily attributed to the overfishing of young and immature fish, and water pollution, which results in eutrophication along with further ecological changes. The appearance of invasive water species, like the water hyacinth, in bodies of water have led to declining catches due to the growing abundance of water hyacinth biomass. In a recent study, the water hyacinth invasion was shown to have serious effects on fish catchability on the Kenyan side of Lake Victoria (Kiyemba et al., 2023).

Charcoal is one of the most important fuel commodities in sub-Saharan Africa, with up to 90% of the Ugandan population relying on firewood and charcoal for energy, exceeding the regional average of 80% (Asiimwe, 2023). The use of charcoal is on the increase due to urbanisation and population growth, offering a cheap, efficient and portable energy solution. However, charcoal production contributes to deforestation, leading to environmental issues like biodiversity loss, soil erosion and carbon dioxide emissions (Chidumayo & Gumbo, 2013). The illegal harvesting of firewood from public forests, woodlands, riverine forests and farms exacerbates deforestation, driven by inefficient cooking methods and improper charcoal production techniques, where wet wood is used instead of dry wood. This results in only 10–20% recovery of charcoal from the wood. Limited awareness, access and adaptability hinder the adoption of alternative cooking

fuels like biogas, briquettes and liquefied petroleum gas. For many who rely on charcoal, these alternatives are either costlier or less accessible. In East Africa, insufficient investment in energy infrastructure, transmission capabilities and generation capacity has left an 'energy gap' filled by wood fuels like charcoal (UNPA, 2020).

Environmental pollution in Uganda is increasing. The most important source of pollution in the country is uncontrolled industrial development in urban areas. Effluent discharge into river systems and untreated wastewater are major contributors to environmental pollution (Failler et al., 2016). Untreated industrial and municipal waste, as well as agricultural runoff have continued to cause eutrophication, algal blooms, invasive hyacinth outbreaks and prolonged anoxic dead zones in parts of Lake Kyoga and Lake Victoria. Artisanal gold mining has also polluted surface water with mercury, while industrial pollution has contaminated groundwater sources near Kampala with heavy metals (USAID, 2021).

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# 5 Food System Drivers

Food systems, with their various activities and outcomes, are influenced by a wide range of factors in complex interconnections. These factors and forces that influence the structure, functioning and dynamics of the food system are commonly termed as “drivers of food system”. Bene et al. defined food system drivers as:

endogenous or exogenous processes that deliberately or unintentionally affect or influence a food system over a long-enough period so that their impact result in altering durably the activities, and subsequently the outcomes, of that system. (2019)

Some key drivers influence food systems’ overarching dynamics, while others have significant implications for specific components within food systems. This chapter discusses major macro-level drivers of the Ugandan food system: demographics, socio-cultural dynamics, political and economic changes, and environmental factors. It further discusses current challenges and future opportunities presented by innovation, technology and infrastructure sectors that have the potential to transform the country’s food systems in the country.

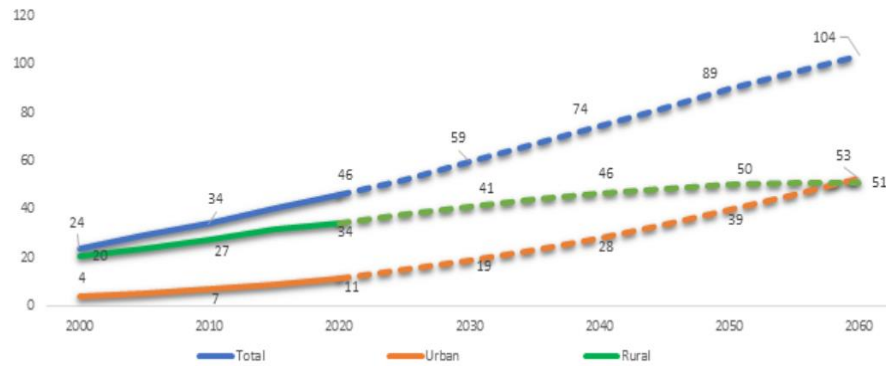
## 5.1 Demographics

Uganda ranks among the top ten fastest growing countries worldwide in terms of population and economy with population growth rate of 3.2% (World Bank, 2023g). The population is expected to rise from 46 million people in 2023 to 100 million by 2050 (World Bank, 2021b). The population is predominantly young with a median age of 16.3 years (Worldometer, 2023). This causes sizeable challenges in terms of ensuring access to quality education for all. Good education levels can contribute to the development of more resilient, efficient and equitable food systems by empowering individuals with the knowledge and skills needed to address challenges and seize opportunities within the agricultural and food

sectors. In Uganda, the literacy rate among individuals aged 15 and above was 81% in 2022, surpassing the sub-Saharan Africa average of 68% (World Bank, 2023). However, the completion rate of primary education stands at 54% for males and 52% for females, which is below the regional average of 71% (World Bank, 2023). According to UBOS, almost a quarter of Ugandan women give birth by the age of 18 (2017). According to official records, around 650,000 teenagers gave birth between 2020 and 2021 (Olukya, 2021). The increasing birth rate has serious implications on the food system, particularly in terms of increasing food demand.

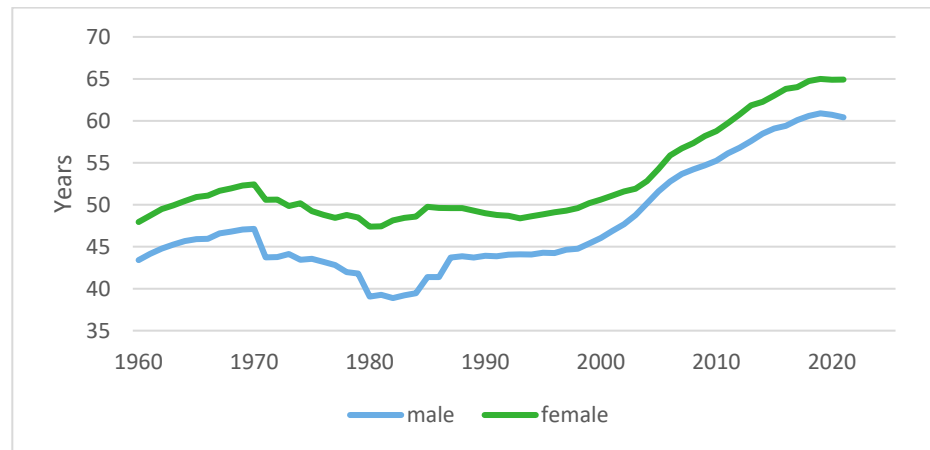
With the current rate of population growth, Uganda’s food demand is expected to increase by nearly 3.5 fold by 2050. High fertility rates coupled with improved incomes in the middle class population shifting to urban centres are the main drivers of demographic changes. Currently, approximately 25% of the population resides in urban areas, but this figure is projected to rise to 50% by 2040 (FAO, 2023). This rapid urbanisation poses various challenges associated with rural-urban migration, including the need for adequate urban planning strategies, the promotion of rural-urban linkages and the enhancement of social and economic opportunities. The rising and changing demand for food can also stimulate local production responses, as well as processing and distribution opportunities (de Bruin et al., 2021). However, with a big proportion of the youth migrating from rural to urban areas, their potential to participate in food production is minimised. Rural-urban migration, especially among the youth population, affects household economies, crop production and agricultural machinery expenditure (Ango et al., 2014; Sun et al., 2021). Youth migration from rural to urban areas often leads to shortages of labour in rural households, resulting in decreased agricultural productivity (Dadi, 2021). Addressing the challenges posed by rural-urban migration on agriculture requires a comprehensive understanding of the factors that drive this migration and implement strategies to promote sustainable agricultural practices and rural development.





**Figure 15** Expected growth for rural and urban areas  
Source: World Bank (2020).

Life expectancy in Uganda has substantially improved over the past 20 years, increasing from an expectancy at birth of 48 in 2000 to 63 in 2021 (World Bank, 2023f). This is slightly higher than the average of 60 years for sub-Saharan Africa in 2021. It appears to have stagnated for both men and women, as visualised in Figure 16.

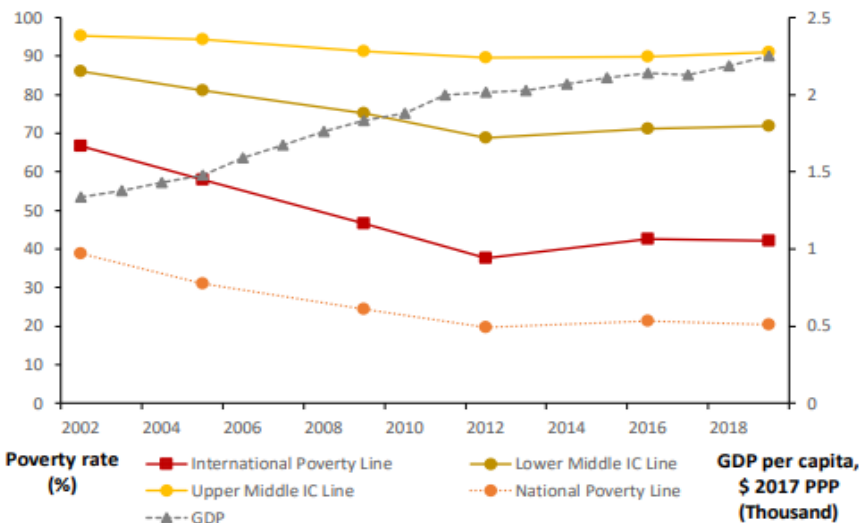


**Figure 16** Life expectancy at birth  
Source: own compilation, based on World Bank (2023e)

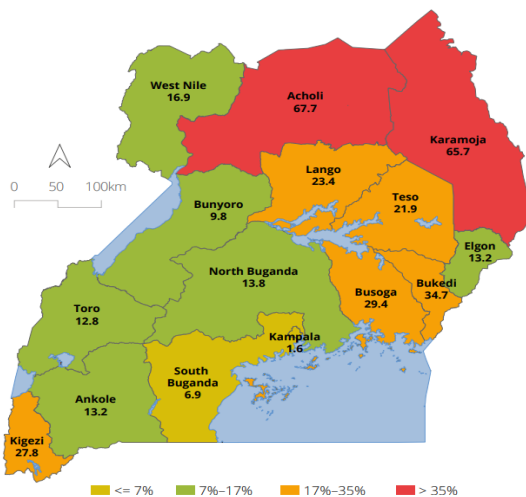
## 5.2 Economic development

Uganda has made notable strides in economic development over the years. The country has experienced steady economic growth with sectors such as agriculture, manufacturing and services contributing to this progress. Increased foreign investment, improved infrastructure and sound macroeconomic policies have played a significant role in fostering this development (World Bank, 2024). Economic development is an important driver of the food system since it affects consumers' income, thereby shaping dietary patterns, as further detailed in Section 5.4 (Béné et al., 2019).

However, despite these positive trends, Uganda still faces the challenge of poverty. A substantial portion of the population continues to live below the poverty line which directly impacts people's ability to access an adequate and nutritious diet. According to recent estimates based on the national poverty line, approximately 21% of Ugandans live in poverty, which is lower than the 42% indicated by the international poverty line, as depicted in Figure 17 (World Bank, 2023a). This indicates the need for continued efforts to address poverty and ensure also the lowest socio-economic class has access to a healthy diet. The Ugandan government, in collaboration with development partners and international organisations, has implemented various rural livelihoods and poverty reduction strategies. These initiatives aim to promote job creation, and enhance agricultural productivity, quality education, healthcare and social safety nets. By focusing on these areas, Uganda aims to uplift vulnerable populations and provide them with opportunities for economic empowerment. Efforts are also being made to promote sustainable and inclusive growth across different regions of the country. Special attention is given to marginalised areas, including rural communities and urban informal settlements, where poverty rates tend to be higher. Figure 18 shows that areas with underdeveloped infrastructure, like Karamoja, have higher poverty rates. By implementing targeted interventions and providing support to these communities, Uganda strives to narrow the poverty gap and improve livelihoods.



**Figure 17** Poverty headcount rate, 2002–2019  
Source: World Bank (2023g).



**Figure 18** Regional variation in poverty rates  
Source: FAO et al. (2023), adapted from Uganda Bureau of Statistics (2021).

### 5.3 Growing market opportunities

Trade agreements play a significant role in shaping food system structures and dynamics, globalising food trade and affecting various fronts, including market access, food security, technical innovation and the development of food quality and safety standards (Béné et al., 2019).

In 2019, the agreement for African Continental Free Trade Area (AfCFTA) came into effect with the aim to eliminate the trade barriers between 54 countries and to boost intra-African trade (Echandi et al., 2022). According to the World Bank, this policy has the potential to be a transformative force for the African continent. For Uganda, the AfCFTA offers several opportunities. Firstly, it provides access to a wide market for Uganda foods and services, enabling businesses to expand their customer bases beyond national borders. Expanded market access can potentially lead to higher export volumes, boosting economic growth and generating employment opportunities. Second, the AfCFTA promotes the diversification of Uganda’s economy by attracting direct foreign investment in sectors such as manufacturing, agriculture and services. Consequentially, diversification of the economy can help reduce dependence on a few primary commodities, enhancing resilience to external shocks and promoting sustainable economic growth (OECD & WTO, 2019).

Trade opportunities in Uganda are currently hindered by food safety implications. Poor postharvest handling, improper methods of applying chemical pesticides and inadequate disease control methods are some of the main factors that contribute to the high levels of microbial and chemical contamination (Kankya et al., 2020). The decline in food quality occurs throughout the supply chain, however, quality issues become most serious in local food markets as they are poorly regulated in terms of food safety, and the markets receive limited investment for advancing food safety infrastructure. Food safety issues at every step of the food supply chain cumulatively result in both economic losses and increased health risks linked to the development of aflatoxins and mycotoxins that can lead to cancers. The country has received warnings from the European Union regarding chemical contamination in the horticultural produce it exports (newvision, 2019). More recently, neighbouring countries have imposed bans on the imports of cereal, dairy and poultry products from Uganda due to aflatoxin contamination (Nakaweesi, 2021). According to the Partnership for Aflatoxin Control in Africa

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(PACA), before the COVID-19 pandemic, 45–65% of samples in major maize-producing districts contained aflatoxin levels that exceeded the national standard; the maximum limits are ten parts per billion for total aflatoxins (PACA, 2017). This problem hinders international trade since some countries and markets have lower minimums for aflatoxin. By 2018, aflatoxin contamination was reported to have reduced Uganda’s economic growth by 0.26% (Lukwago et al., 2019). The use of agrochemicals is increasing in Uganda’s agriculture sector. However, farmers do not adhere to simple rules about when crops should be sprayed (Staudacher et al., 2021). It is common to find fresh tomatoes that have been sprayed with pesticides on market stalls (Atuhaire et al., 2017). Sellers believe pesticides prolong the shelf-life of the harvested vegetables. At the market level, food is laid on the ground, meat is sliced on unhygienic surfaces like logs, and unhealthy chemicals are used in preservation. Freshly treated animals are sold for slaughter further exposing consumers.

To enhance competitiveness in transboundary trade, in collaboration with various development organisations, the government has intensified efforts to improve adherence to food safety regulations. In 2019, the Ministry of Agriculture, Animal Industry and Fisheries imposed a self-ban on the export of chili to prevent a complete ban on all Ugandan commodities in the European market (Monitor, 2019). However, such stringent safety regulations sometimes have unintended consequences that can pose challenges for certain population groups. The expenses associated with meeting food safety standards can pose financial burdens on Micro, Small and Medium-Sized Enterprises (MSMEs), limiting their ability to benefit from trade opportunities (OECD & WTO, 2019).

## 5.4 Shift in dietary patterns

A deeply ingrained food culture plays a pivotal role in driving Uganda’s food system, shaping dietary preferences by affecting food choices, preparation methods and the cultural and social significance attached to food. Staple foods like bananas, maize, millet, cassava and sweet potatoes hold deep cultural significance and are embedded in traditional practices across various regions. Traditional Ugandan dishes like matooke, posho and luwombo are prepared according to cultural customs, influenced by heritage and cooked using specific methods and flavours. Dietary choices are also influenced by cultural norms and

taboos, which often value indigenous foods like leafy vegetables, tubers and fruits. This contributes not only to nutrition but also to cultural identity. These choices are deemed to improve nutrition and preserve culture.

More recently, however, as in many African countries, a new trend has been observed where people are more inclined to adopt western diets over traditional diets. This is partly linked to other drivers discussed in this chapter, such as economic growth and urbanisation. The increase in income in middle-class families and in the influences of urbanisation encourages dietary diversification, including increased consumption of animal products, sugars, fats and processed foods. As urbanisation intensifies and the middle-class population expands, there is a likelihood that a significant proportion of the population will be driven to consume unhealthy fast foods, changing the country’s nutritional profile and placing burdens on the health sector (Ayo et al., 2012). Fast food is seen as an easy solution to consumers’ busy schedules and limited meal preparation times that are the result of urban lifestyles. Another significant contributor to the increased consumption of packaged and processed food is the concern surrounding food contamination, which is higher in raw food items sold at local food markets. A study into the impact of food safety concerns of consumers in low and middle-income countries revealed that key concerns included a fear of pesticides, fertilisers, hygiene in and around food outlets, and unhygienic practices at the vendor and household levels (Liguori et al., 2022). They concluded that food safety concerns hinder the consumption of animal sourced food and fresh food and vegetables, and it increases the consumption of starchy staples and processed or packaged food.

## 5.5 Science and technology

Technological advancements have great potential in transforming Uganda’s food system, addressing key challenges and unlocking opportunities for sustainable development. More recently, government has started to support the science and technology sectors to identify potential solutions aimed at reshaping the trajectory of food system according to the UNFSS action pathways (Government of Uganda, 2021). According to the Global Innovation Index, Uganda has consistently demonstrated superior innovation performance compared to other low-income and sub-Saharan African nations over the past few years (Kawooya et al., 2018).

This progress can be attributed to the country's continuous economic growth, commitment to fostering private-sector development and reforms to innovation policy.

Despite the attention paid to technological development, the adoption of advanced technologies on the farm level has challenges. According to the FAO's food system analysis, only 4% of farmers currently utilise productivity-enhancing technologies, mainly due to their associated high costs and limited access (FAO et al., 2023). Moreover, the Ugandan government has raised concerns about unauthorised input dealers distributing fake agrochemicals, which negatively affect agricultural productivity and pose risks for human health and the environment (Ssali, 2021). Currently, less than 1% of farmers utilise irrigation, limiting their ability to produce food consistently, especially during periods of water scarcity (FAO et al., 2023). Technological innovation at the farm-level could improve livelihoods, enhance household incomes and increase job opportunities. Moreover, advancing irrigation techniques, including low-cost options such as hydroponics and aquaponics, could help tackle water scarcity challenges and increase diverse food availability year-round. Increased adoption of post harvesting and processing technologies could reduce food losses and improve food safety throughout the food value chains.

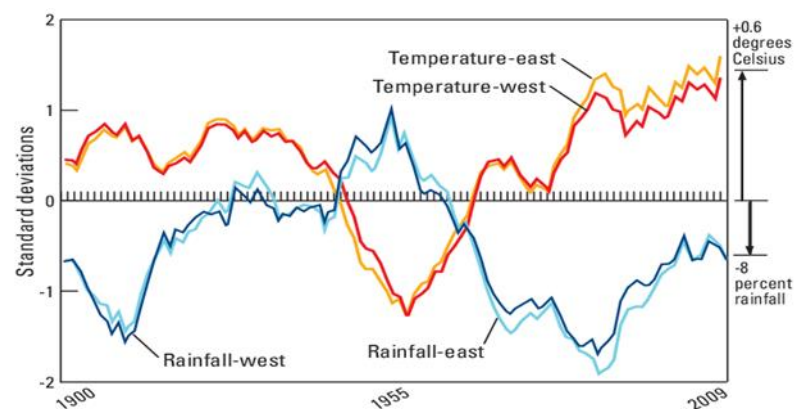
Innovations in ICT and mobile technology offer multiple opportunities for food system actors. In recent years, numerous initiatives have been launched to provide market information, forecast weather, enable knowledge transfer and enable access to finance by mobile phone (Olaniyi, 2016). Namubiri et al. (2018) found that, within rural areas, approximately 18.2% of households use ICT tools to access food security information. Most of these households accessed information from local FM radio stations and mobile phones. Findings also indicate that the utilisation of ICT tools in accessing food security information improves households' food security status by 38%.

The adoption of technology requires well-developed digital infrastructure. Access to the internet has improved in recent years. According to Kemp (2022), approximately 29% of the Ugandan population has access to the internet. The World Bank (World Bank, 2023e) reports a lower proportion of internet usage: around 10%. All sources indicate that the development of the internet network in Uganda is lagging behind in comparison to neighbouring countries. Uganda has

some of the highest costs for internet in Africa, while the quality (speed, stability) is among the lowest due to the inadequacy of the electronic network (Surfshark, 2023). Other identified barriers for internet usage are the lack of awareness or knowledge on how to use it and low availability of internet-capable devices (Research ICT Africa, 2023). Improving access to the internet might boost innovation and adoption of technology.

## 5.6 Climate and environment

Agricultural production in Uganda is almost entirely rain-fed and therefore marked by seasonality and highly vulnerable to extreme weather conditions. According to the climate risk profile, developed by the World Bank (2021a), all of Uganda is at risk to natural disasters. Previously, Uganda's climate could be characterised as stable with predictable periods of rain. However, more recently, weather patterns have begun to change and, like many countries around the world, Uganda has experienced significant negative effects as a result of climate change and variability, as depicted in Figure 19. Climate change and variability present new risks and threats. Climate-related risks, such as prolonged dry seasons, are becoming more frequent and intense with severe negative effects on agricultural livelihoods and food security.



**Figure 19** Rainfall and air temperature time series in crop growing regions  
Source: USGS & USAID (2012).

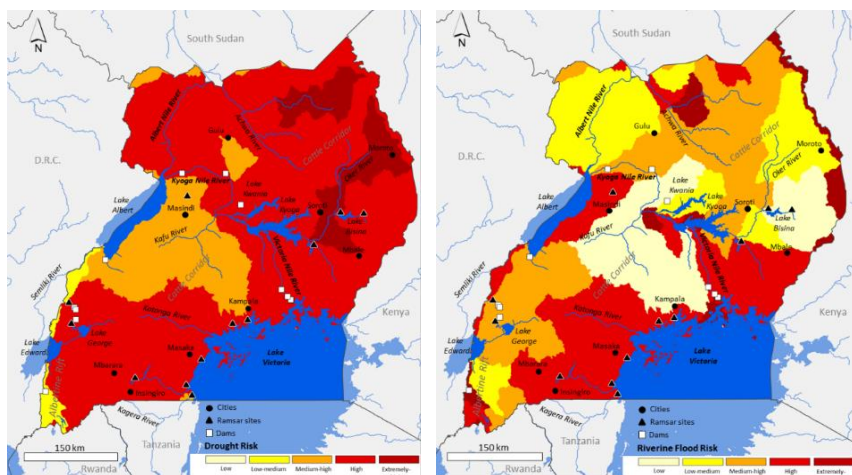
The most significant effect on seasonal rainfall has been observed during the months of March, April and May, with a decrease in average monthly rainfall by 6 mm. This decline in rainfall has particularly affected districts in northern Uganda, more especially Gulu, Kitgum and Kotido (World Bank, 2021a).

Over the past 20 years, Uganda has regularly been affected by natural disasters, like floods, droughts and landslides, affecting around 200,000 Ugandans annually (World Bank, 2021a). Flooding, particularly in low-lying areas of the country, presents the largest risk (Figure 20b). Floods have become more severe due to increased short yet heavy rainfall events, which cause extensive damage to the country's infrastructure, settlements, food production and general development. Each year, floods affect nearly 50,000 people and incur costs exceeding 62 million USD (World Bank, 2021a). The mountain regions of the country, such as Mbale district in the Mount Elgon region, experience extreme rainfall events that cause mudslides, landslides and flooding. Incidents of this nature result in the loss of human and animal lives, as well as crop destruction.

In contrast, the western, northern and north-eastern regions of Uganda have faced a higher frequency of prolonged droughts over the last two decades (Figure 20.a). According to the World Bank, droughts affected approximately 2.4 million people between 2004 and 2013 (World Bank, 2021a). Besides human and livestock fatalities, areas affected by severe drought spells have experienced diminished water tables, lower water levels in major lakes, crop failures and consequential fluctuations in food prices. The districts within the 'Cattle Corridor', which stretches across Uganda diagonally from the southwest to the northeast, are particularly prone to droughts. Of them, the Karamoja regions have faced extreme droughts, leading to agricultural losses and significant concerns about food insecurity. A key example of the impact of drought on food security was witnessed in July 2022, when a prolonged and severe drought pushed half a million people into starvation, and hunger was reported as the cause of 200 deaths during that month (Reuters, 2022). These adverse impacts underscore the importance of developing measures to make food systems resilient and to prevent food insecurity in vulnerable communities.

Climate change exacerbates biodiversity losses, reducing agricultural resilience and making food systems more susceptible to pests, diseases and extreme weather events (WWF, 2021). Although there is no complete record of the status of agrobiodiversity in Uganda, of the estimated 1,400 indigenous plant species (many of whose potential is yet to be exploited), 30 species are known to be endangered, 43 are rare and ten are vulnerable (Bioversity International, 2019). Indigenous and traditional food plants and livestock breeds have always ensured food and nutrition security, and they are still widely consumed in Uganda. However, they are being progressively replaced by exotic foods and modified crop varieties (Tumuhe et al., 2020). Indigenous cattle breeds, which are crucial for food and cultural functions, decline due to the popularity of high-yielding exotic breeds amid land scarcity (Tumuhe et al., 2020). Uganda, a Party to the Convention on Biological Diversity, acknowledges the pivotal role of biodiversity in the food system and is committed to reducing and reversing biodiversity loss (Pomeroy et al., 2017).

The effects of climate change related challenges in the food system, which includes issues like crop yields, water scarcity and heightened pest and disease infestations, are notably more severe for smallholder farmers. They are further exacerbated by the lack of resilience training and limited access to resources. At



**Figure 20** A) Drought risk; B) Riverine Flood risk  
 Source: USAID & Sustainable Water Partnership, 2021.



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the local and national scales, climate change induced disruptions in food production lead to food price volatility, which affects vulnerable communities' access to nutritious food.

## 5.7 (Geo)politics

Geopolitical shocks, such as conflicts, trade disputes, or geopolitical tensions, wield significant influence over the functioning of the food system. While they may immediately disrupt value chains during the shocks, their long-term effects can also act as catalysts for food system transformation. This section underscores how shocks can act as driver of the food system with two recent examples of geopolitical shocks.

### 5.7.1 The COVID-19 pandemic

The COVID-19 pandemic has had significant effects on Uganda's food security. The country experienced disruptions throughout the food supply chain due to lockdown measures, travel restrictions and economic slowdown. Many businesses, especially ones in the informal sector, faced closures, reduced production and loss of income (Ubabukoh & Tampubolon, 2023). In response to the pandemic, the Ugandan government implemented stringent shutdown measures, including full and partial closures of schools that lasted for over 83 weeks, one of the longest disruptions globally (Muhumuza, 2022). These measures resulted in many students dropping out of schools permanently post-lockdown. Moreover, school dinners and other child development programmes were suspended. As a result of the decline in tourists, revenues from tourism dropped by 72% during the pandemic, significantly affecting the income of people employed in the tourism sector (Nabukeera, 2022). According to the 2019/2020 Uganda National Household Survey, due to COVID-19 pandemic, the number of people in poverty in the country increased from 8 million to 8.3 million (UBOS, 2021) In June 2020, in Uganda's Socioeconomic Impact Assessment of the COVID-19 pandemic, the United Nations projected that around 1.9 million people were likely to have fallen into poverty during just eight weeks of lockdown (UN, 2020).

Lowered levels of income during the pandemic severely decreased purchasing powers and people's ability to afford food. In addition, high fluctuations in food

prices were experienced due to disruptions in food systems (Buzigi & Onakuse, 2023). Normally, many food products are distributed by cheap informal transport systems, like taxis and buses. However, this was not possible during the lockdown due to the suspension of public transport.

On a positive note, the disruptions in the value chain created opportunities for innovative businesses, leading to a significant increase in the number of E-commerce businesses. These businesses have continued to thrive after the pandemic period. One illustrative example is the collaboration between the UN Capital Development Fund and the online motor taxi service SafeBoda, which resulted in a novel e-commerce platform (UN News, 2020). This platform effectively linked food vendors with customers. Through the SafeBoda app, customers could remotely place orders for food produce, which were then delivered by accredited riders and paid for using mobile wallet features. The growth in SafeBoda users led to a notable boost in market vendors' income, with some even experiencing higher levels of business compared to the period before the lockdown. People involved in the trade of dry produce, especially maize and beans, also benefited from the e-markets. The success of the e-market is evident from the fact that the government and philanthropists used digital platforms to purchase of food grains in bulk for distribution amongst vulnerable groups. Studies found that, in some informal settlements, household food consumption was better during the lockdown than after it due to the food aid (Buzigi & Onakuse, 2023). However, the amount of food aid was not sufficient to serve all vulnerable households.

### 5.7.2 War and conflict

War or conflict significantly affects food systems by disrupting supply chains and impeding peaceful transactions necessary for ensuring an adequate food supply (Africa Center, 2023). Even in peaceful countries like Uganda, conflicts in neighbouring countries can disrupt the food system, leading to high influxes of refugees and increasing local food demand. As a relatively stable country, Uganda is a popular country for families escaping violence in South Sudan, the Democratic Republic of Congo, Somalia and Burundi, making Uganda Africa's largest host country for refugees. At present, there are over 1.5 million registered refugees and asylum seekers in Uganda (UNHCR, 2023). Of the registered refugees, 80% are women and children, of which 38% are aged under 12 years of age. North-

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western districts, like Adjumani and Yumbe, have the highest concentration of refugees. These areas are characterised by elevated poverty levels and insufficient infrastructure, meaning families living in these areas are even more susceptible to natural disasters and socio-economic conflicts.

Despite the distance, the impact of the war between Ukraine and Russia has been felt in Uganda. Similar to other sub-Saharan African countries, prices for food, fuel and fertilisers have risen tremendously due to trade disruptions and sanctions against Russia. A key consequence was the disruption to grain exports from Ukraine. Ukraine is considered to be the 'Granary of Europe', and the disruption to food grain exports led to high global food prices. The World Food Programme relies heavily on Ukrainian grain for the provisioning of food aid. The fluctuations in global market prices trickled down to local markets. This is exemplified by wholesale prices of maize and rice in Kampala undergoing a 41% and 33% increase in February and May 2022 (Diao et al., 2022). The increased prices of mineral fertilisers led to a reduction in fertiliser application by smallholder farmers, resulting in decreased agricultural productivity. While the increased price of fertilisers had a minimal impact on food prices for staple foods, as the use of fertilisers in staple food production is not common, it significantly affected the economic yields of farmers who produced cash crops, in turn affecting their purchasing power (Diao et al., 2022). In the study conducted by Diao et al. (2022), it was concluded that, of all commodities, shocking fuel prices had the highest impact on the decrease of national GDP and the decline in use. Many households faced a dual challenge presented by rising food prices and falling incomes. Moreover, due to the high financial burden on the governing system, humanitarian aid budgets were cut, resulting in suspension of programmes promoting long-term food and nutrition security in Uganda.

The Ukrainian war underscored the reliance on the global agricultural market, particularly the heavy dependence on imports of staple crops from Ukraine and Russia. The sudden shortage of wheat, maize, and other grains, raised awareness of the importance of achieving self-sufficiency to avoid famines in times of crisis.

# 6 Food system structure, actors and activities

This chapter maps the key actors in the Ugandan food system and the activities along the value chain that they are involved in. The key elements of the food system are production, processing, trade, retail and consumption. This structure is used to discuss the food system activities and provide context by describing their enabling environment.

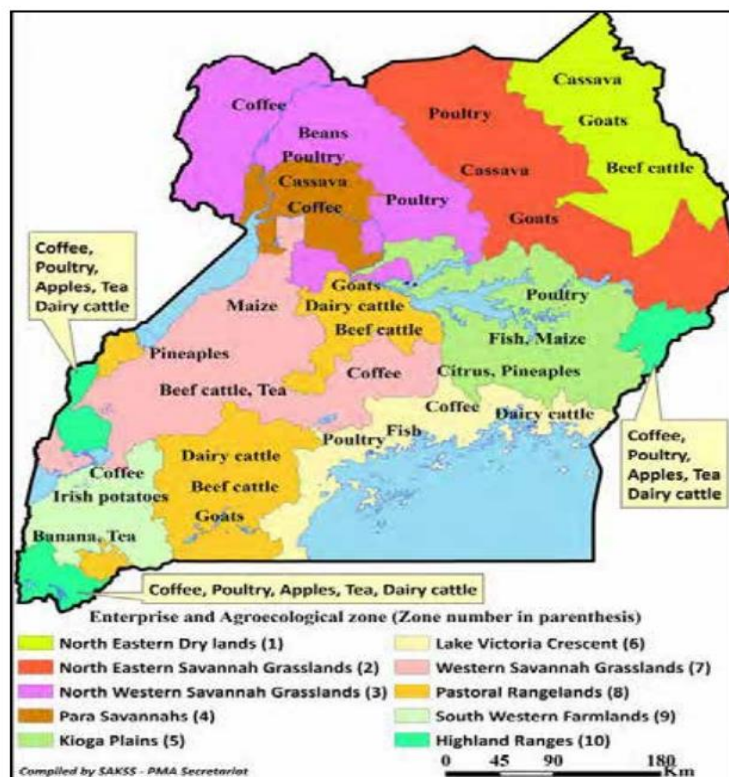
**Table 1** Overview of key food system actors along the value chains and their main activities

Production	Processing	Trade	Retail	Consumption
<p><b>Agriculture</b></p> <ul style="list-style-type: none"> <li>80% of total land in Uganda is arable but only 35% is being cultivated (FAO, 2024)</li> <li>crop production contributes to 57% of total agricultural output value and livestock to 16% (FAO, 2023).</li> <li>Increase in livestock production with high number of goats (43%) and cattle (33%) (FAO, 2023).</li> </ul> <p><b>Labour</b></p> <ul style="list-style-type: none"> <li>Over 60% of Uganda’s labour force is employed in the agricultural sector.</li> <li>In 2018, the country had 7.4 million agricultural households, representing 80% of total households (FAO, 2023). More than 65% of these households were involved in crop production.</li> <li>Ratio of extension workers to farmers is 1:1,800, compared to the recommended 1:500 (MAAIF, 2019).</li> </ul>	<p><b>Packaging &amp; manufacturing</b></p> <ul style="list-style-type: none"> <li>Most agro-food firms are MSMEs.</li> <li>Food processing accounts for 40% of the total manufacturing output (Fowler &amp; Rauschendorfer, 2019).</li> <li>The main food processes in volume are grain milling, bakery production, dairy products and producing edible oils and fats.</li> <li>Firms do not operate to their full potential; e.g. the dairy industry only works at 58% of its total installed capacity (EPRC, 2018).</li> </ul> <p><b>Storage and disposal</b></p> <ul style="list-style-type: none"> <li>30-50% of food is lost due to inadequate infrastructure, storage facilities, and post-harvest handling practices (FAO, 2019).</li> <li>Food waste per capita is with 104 kg/ year higher than global average of 74 kg/year (UNEP, 2021).</li> </ul>	<p><b>Marketing</b></p> <ul style="list-style-type: none"> <li>Most food is traded through informal markets.</li> <li>Wholesalers and retailers frequently use agents as middlemen.</li> <li>Next to traders, men are involved as porters, and both men and women act as cleaners in the trading sector.</li> </ul> <p><b>Import &amp; Export</b></p> <ul style="list-style-type: none"> <li>Uganda has positive net trade balance since 1990 (OECD, 2024).</li> </ul>	<ul style="list-style-type: none"> <li>Informal markets are a crucial food source, especially for low socio-economic classes in urban areas.</li> <li>There are numerous small shops with a high variety of food products in both urban and rural areas.</li> <li>Supermarkets are located in urban areas and sometimes operated under international brands, such as Carrefour. However, the business climate for large supermarkets is challenging.</li> <li>High rise in e-commerce observed for ordering fast food via app such as Jumia food and Glovo, or for products to be delivered from local markets on request.</li> </ul>	<ul style="list-style-type: none"> <li>Uganda has over 50 million consumers, including high number of refugees (Worldbank, 2023)</li> <li>The East African community market size is estimated at 300 million consumers (Lubuulwa et al., 2022).</li> <li>Ugandan consumers spend 57% of their total expenditure on food on average (Dolislager et al., 2022).</li> <li>40% of total food purchases are staples (Dolislager et al., 2022).</li> <li>Consumption of (ultra-)processed food is on the increase, especially in urban areas.</li> </ul>

## 6.1 Food system activities

### 6.1.1 Production

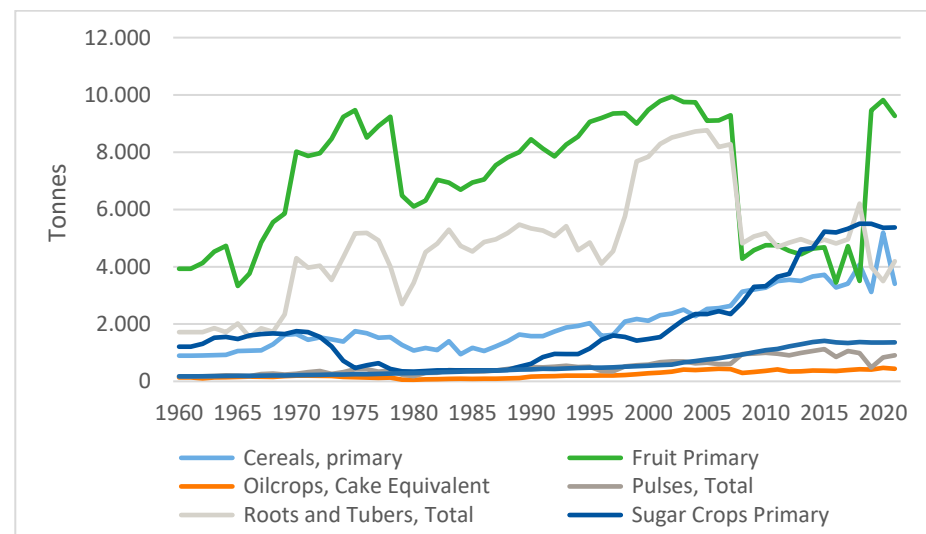
In 2018, Uganda had a total of 7.4 million agricultural households (FAO, European Union, et al., 2023). Of these households, most (66.4%) engaged in crop production, 16.7% solely exclusively on crop production, and only 11% were involved in non-crop agricultural activities (Uganda Data Portal, 2018). On average, each household had a landholding area of 1.4 ha and possessed an average of two land parcels. Farmer organisations are limited in number.



**Figure 21** Key agroecological zones across the country  
Source: (MAAIF, 2018).

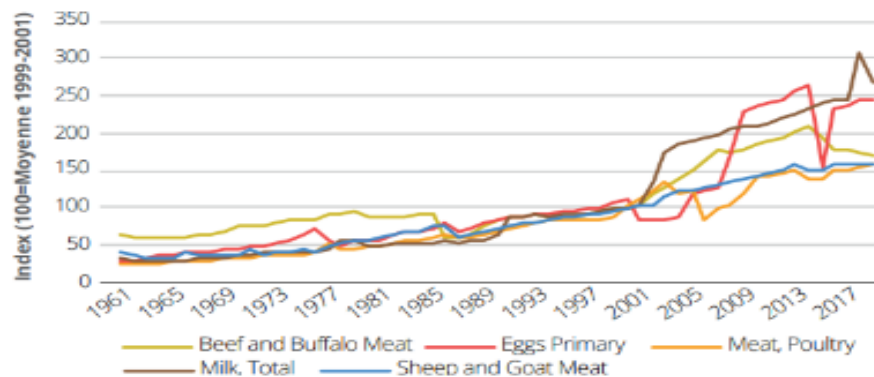
Uganda has favourable climatic conditions that allow for a wide variety of crop production. 80% of Uganda’s land is arable but only 35% is being cultivated (FAO, 2024). Maize, sweet potato, cassava and green banana are the main food crops in terms of production quantities (Ministry of Agriculture, Animal Industry and Fisheries, 2018). The main cash crops are coffee, tea and cotton. Figure 21 provides a schematic overview of the most important agricultural products cultivated in the different parts of the country, depending on the agricultural conditions, socio-economic and cultural factors (Ministry of Agriculture, Animal Industry and Fisheries, 2018).

Crop production contributes to 57% of the total agricultural output value and approximately 12% of the country’s GDP (FAO, 2023). Figure 22 shows production trends since 1960 and the sharp decline in the production of roots, tubers and fruit in 2009. This could be (partly) attributable to the devastation of banana plantations by Banana Bacterial Wilt disease or measurement inaccuracies. Overall crop production in the country has failed to keep abreast of population growth, especially after 2008.



**Figure 22** Total production per food group 1961–2021  
Source: own compilation based on FAO (2023).

Livestock constitutes 16% of Uganda’s total agricultural output and 3.5% of its total GDP. As of 2019, Uganda had approximately 14.8 million cattle, 16.9 million goats, 43.1 million poultry, 4.4 million pigs and 4.7 million sheep. The production of all livestock products has increased, mainly due to the increasing number of animals (see Figure 23).



**Figure 23** Evolution in animal production (index)  
Source: FAO et al. (2023).

Animal welfare is globally recognised as a component of the United Nations Sustainable Development Goals (SDGs) for ensuring sustainable food production as it impacts livestock productivity, food safety and environmental health (Doyle et al., 2021). However, understanding of welfare management across various livestock sectors in Uganda remains low (Oba et al., 2021). In Uganda, pig production has dramatically increased over the last three decades in response to the growing demand for pork, with the national pig population reaching 4.47 million pigs, produced by 1.34 million households. (Ouma et al., 2017; UBOS, 2021). However, challenges like poor hygiene inadequate nutrition and improper reproductive management contributes to low productivity. Furthermore, the lack of effective biosecurity measures, limited access to veterinary care, and insufficient availability of vaccines result in a high incidence of diseases, with annual endemic African swine fever outbreaks being reported. Despite its clear relevance to productivity, economic losses, and human health risks, animal

welfare remains a low priority for both public and private sector stakeholders (Oba et al., 2021).

The Ugandan fisheries sub-sector has primarily relied on natural water bodies, with lakes contributing up to 90% of the total fish catch (Ministry of Agriculture, Animal Industry and Fisheries, 2018). The fishery sector contributed 1.6% to Uganda’s GDP in 2016 (WCMC, 2020). However, this percentage is likely to be considerably higher because approximately 80% of fishers operate in an ‘artisanal’ manner, meaning they mainly catch fish for local consumption or sell to consumers directly. The sector supports the livelihoods of over 1.5 million Ugandans directly, with a significant proportion being women and youth, comprising 70–87% of the workforce (Ministry of Agriculture, Animal Industry and Fisheries, 2018).

### 6.1.2 Processing

In Uganda, the agro-processing industry contributes around 60% of the total manufacturing output, of which food processing accounts for 40% (Fowler & Rauschendorfer, 2019). According to data on registered businesses, the main food processing sectors in units of weight are meat (154 MT), fish (41 MT), edible oils and fats (262 MT), dairy products (327 MT), grain milling (359 MT), bakery productions (359 MT) and sugar processing (170 MT) (Institute of Export, 2022). According to the EPRC, most agro-processing units operate below their full potential. For instance, dairy processing firms operate at around 58% of their installed capacity (EPRC, 2018).

Domestic agri-food processing businesses are predominantly SMEs that operate at different levels of the value chain, from primary processing, like milling, drying and roasting, to secondary processing, such as baking, brewing and canning, to tertiary processing, like packaging, branding and marketing. In terms of size, these businesses typically have a workforce of less than 100 workers and a turnover of less than 360 million Ugandan shillings per year. Most businesses focus on transforming locally grown raw food into a variety of products, such as maize flour, cassava chips, coffee, tea, beer, juice, bread, biscuits, snacks, dairy products and meat products. These products are mostly supplied to local markets. However, a few local food processors also export their products to regional and international markets. Recognised local food processing entities in Uganda include



Mukwano Group, Bakresa Group, Pembe Flour Millers and Bidco Africa (FoodBusinessAfrica, 2020).

Description	Weight	Year					Annual percentage change-2020
		2016	2017	2018	2019	2020	
<b>Total Manufacturing</b>	<b>1000</b>	<b>234.67</b>	<b>245.29</b>	<b>268.34</b>	<b>277.69</b>	<b>285.91</b>	<b>3.0</b>
<b>FOOD PROCESSING</b>	<b>400</b>	<b>211.57</b>	<b>204.14</b>	<b>264.04</b>	<b>251.64</b>	<b>239.79</b>	<b>-4.7</b>
Meat Preparation & Processing	2	58.19	68.52	70.54	63.12	42.53	-32.6
Fish Processing & Preservation	28	28.83	48.37	57.21	52.96	31.96	-39.7
Edible Oils & Fats Production	42	345.47	367.63	379.20	453.88	435.26	-4.1
Dairy Production	10	338.26	412.63	580.46	730.01	807.67	10.6
Grain Milling	9	536.05	454.82	494.94	493.32	470.33	-4.7
Bakery Production	9	582.84	722.29	715.73	858.51	553.39	-35.5
Sugar Processing	139	251.62	196.69	324.11	254.55	275.69	8.3
Coffee Processing	89	114.43	143.27	134.81	148.26	121.09	-18.3
Tea Processing	68	157.56	147.95	211.54	178.35	152.75	-14.4
Animal Feed Production	5	111.41	117.22	140.92	155.06	149.02	-3.9
Other Food Processing	1	69.28	22.91	26.83	23.71	15.60	-34.2

**Figure 24** Share of different food processing sectors to total manufacturing sector

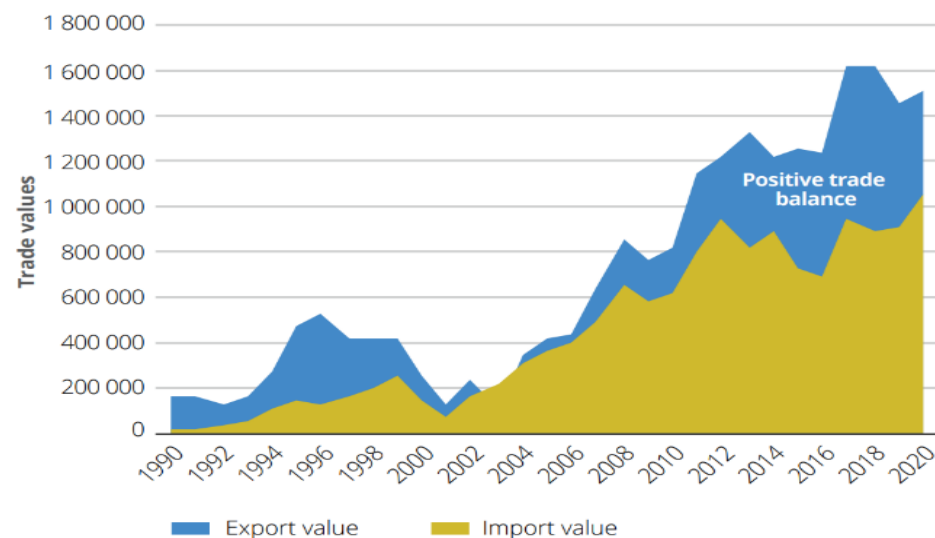
Source: Fowler & Rauschendorfer, 2019.

Besides the small and medium sized food processing companies, there are a few large multinational food processors in Uganda. These are major corporations that operate in the upper echelons of the value chain, specialising in tertiary processing activities like packaging, branding and marketing for products such as soft drinks, bottled water, confectionery, cereals and baby food. Unlike food MSMEs, multinational food processors source their raw materials from both local and global suppliers, and they distribute their products to local and foreign markets. Examples of these corporations are Coca-Cola, PepsiCo, Mandela Grain millers and Danone (U) Ltd (FoodBusinessAfrica, 2020).

### 6.1.3 Trade

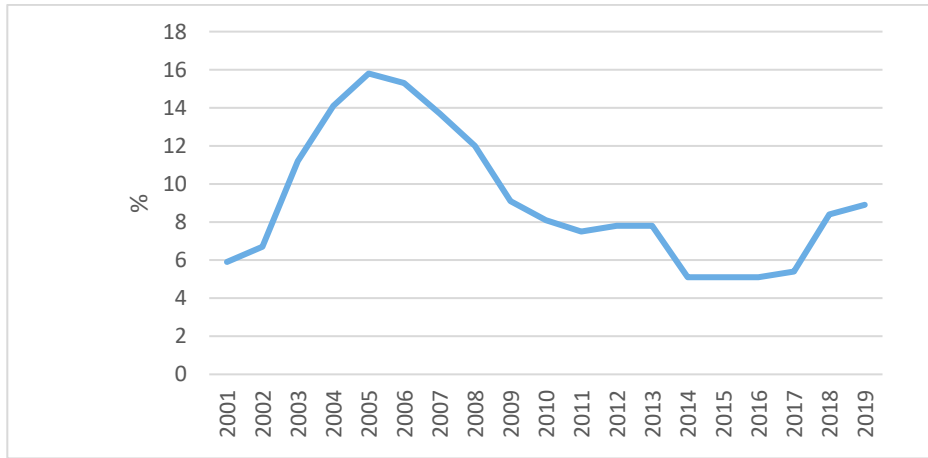
Since 1990, Uganda has maintained a positive trade balance for agricultural products, indicating that it exports more agriproducts than it imports (Figure 25). In 2022, major exported products, comprising of coffee (50%), fish (8.2%), sugar

(4.1%), cocoa beans (4.0%) and milk (3.0%), accounted for a significant portion of total food exports valued at 1.51 billion USD (OECD, 2024). Conversely, palm oil (19.1%), wheat (18.3), animal food (11.2%) were the primary import products by value, expressed as percentages of the total imported food value (573 million USD) in the same year. A steady increase in the volume and value of imported foods into Uganda has been recorded. This trend is driven by the insufficient domestic production of certain foods, such as rice, wheat and palm oil, and it has consequences for the food system at both the local and national scale. Furthermore, there are instances where domestically produced grains and sugar cannot meet the necessary quality standards, resulting in increased dependence on imports for these commodities. Figure 26 shows the cereal imports dependency ratio over time, highlighting how much of the available domestic food supply has been imported. Fresh food products, such as fruits and vegetables sold in markets, are mostly grown locally. Most farmers sell their food in spot markets at the time of harvest, frequently engaging with local small-scale traders to distribute their produce (Nalubowa et al., 2024).



**Figure 25** Trade balance of agriproducts (in USD)

Source: FAO, 2023.



**Figure 26** Cereal import dependency (2000–2022)  
 Source: own compilation based on FAOSTAT data, average of three years is used (FAO, 2023).

Processed food takes a variety of routes from the factory to the market. A significant amount of processed food is distributed through informal, unregistered wholesalers located in major towns and cities. They are often concentrated on busy streets that serve as business hubs, like Kikuubo in Central Kampala. Wholesalers often get produce via their agents, who are intermediary traders that get the produce from farmers in rural areas. A small percentage of farmers are connected to wholesalers directly.

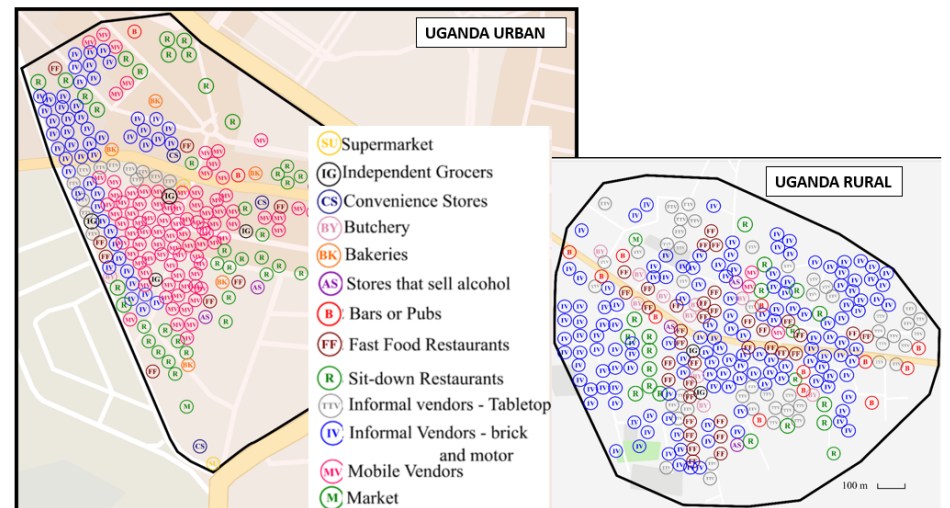
Besides wholesalers, factory outlets are also common, which cater to smaller wholesalers, retailers and consumers. Dairy products are commonly sold in factory outlets, such as Fresh Dairy, Jesa Farm Dairy, Rainbow and Lato Milk. However, large beverage manufacturers, such as Coca-Cola, Uganda Breweries and Crown Beverages, distribute food locally and regionally through registered franchisees.

The numerous activities in the food trade sector involve a vast workforce, and its expansion is creating job opportunities, particularly benefitting low-income households. A range of occupations, such as portering for which men are employed to carry bags weighing up to 120 kgs, contribute to this workforce.

Women from low-income households often take up jobs such as cleaners in food processing units, cleaning charcoal and sand from food products. Both porters and cleaners are paid standard minimum wages, determined by factors like size of the load and level of contamination. (Schoonhoven-Speijer & Vellema, 2020).

### 6.1.4 Retail

Informal markets play a large role in food provisioning in both rural and urban areas. In rural areas, markets are often located on farms, on the roadside or in rural market centres. In urban areas, mobile vendors are common, frequently selling one or two types of vegetables or street foods like the chapati snack called 'rolex'. The poor population relies solely on informal markets for their daily food needs, but the higher socio-economic classes also depend on informal big open markets, kiosks and street vendors to a lesser extent. A study has revealed that 70% of urban households buy their food from street vendors regularly (IFPRI, 2017). Figure 27 provides a snapshot of the different types of retailers in an urban area (Kampala) and a rural area in Eastern Uganda.



**Figure 27** Snapshot of the distribution of food retail outlets in Uganda in urban and rural areas  
 Source: Spires et al. (2020).

Since the year 2000, an increase in the number of supermarkets has been observed in urban areas. This growth has been attributed to the country's favourable investment climate, the rise in urbanisation, the growth of the middle class and the increase in the number of employed women (Elepu, 2009). Many of these supermarkets operate under international brands, such as Carrefour, which originates from France. Primarily catering to the middle to high socio-economic classes, these supermarkets are estimated to serve more than three million of the total population of over 40 million people (Senyonyi, 2019). There has been criticism of the widespread expansion of supermarkets and grocery stores as they source goods from countries like South Africa. The concern is that these supermarkets marginalise local farmers by selling imported products that could instead be procured locally (Elepu, 2009). One of the contributing factors to the growth of grocery shops is that food items sold in them are perceived as higher quality in terms of safety levels, they and offer more variety compared to food items sold at open and roadside markets.

Although there has been a surge in the supermarket businesses in the last two decades, more recent years have witnessed a decline. According to some case studies, supermarket businesses are facing challenges leading to closures, like the two Kenyan based Supermarkets Nakumatt and Uchumi, as well as Shoprite, which is from South Africa. Unprecedented debts, increased competition, inadequate infrastructure, high operational costs and poor stock management also contribute to the challenges supermarket businesses face (Mwamba & Qutieshat, 2021). Furthermore, some top supermarkets have faced criticism for selling rotten meat and expired goods, which indicates that supply exceeds consumer demand (Senyonyi, 2019). In a study conducted by Spires et al. (2020), it was noted that fruits and vegetables purchased at big retailers were of inferior quality compared to produce bought from informal markets. Another reason for reduced footfall in supermarkets is their location. They are often located outside city centres making them inconvenient for Uganda's predominantly pedestrian population to visit them daily. People prefer their nearest retail shop rather than driving to a supermarket (in case a customer owns a car). As the convenience and quality of products are the most important factors for consumers, supermarkets are losing their popularity. The challenging business climate for supermarkets is in line with findings for other sub-Saharan countries.

On the other hand, there has been a notable rise in the importance of e-commerce in the food sector in recent years as also highlighted in section 5.7.1. (Mwamba & Qutieshat, 2021). The use of online apps for ordering fast foods from restaurants is especially popular among the middle class. Moreover, food products from the local retailers can be ordered by phone. The most common online platforms that contribute to the e-food business in Uganda include Glovo, Jumia food and SafeBoda. Growth in e-commerce created jobs and livelihood opportunities in food delivery services, especially for women and youth (Africa, 2020), but it has also enhanced digital literacy and created co-benefits for actors throughout the entire food value chain.

### 6.1.5 Consumption

In Uganda, the traditional diet primarily consists of green banana, maize, cassava, millet, yams, peanuts, pumpkin, beans, green vegetables and various fruits, with limited consumption of meat and fish (Holmager et al., 2021). However, recently, rice, wheat bread, sweet potato, meat and soft drinks have become more prevalent in the diet. Household expenditure data, which includes food obtained by own production, gifts and out of home consumption, shows that 40% of the expenditure on food is spent on starchy staple products (Dolislager et al., 2022). Additionally, food groups that are considered healthy (i.e. vegetables, beans, fruits and animal products) collectively account for 46% of total food expenditure. These numbers are comparable for urban and rural households. Likewise, the shares for the different food groups do not differ largely for different socio-economic classes. However, the share spent on ultra-processed food increases with rising income and is higher for urban households (26%) than rural households (14%). The major motivations for consuming fast-food are taste, convenience and relatively short preparation time (Ayo et al., 2012).

### 6.1.6 Food disposal

According to the UN Environment Programme Food Waste Index Report (UNEP, 2021), the annual per capita food waste in Uganda is reported to be significant, with each Ugandan discarding an average of 103 kg of food annually, compared to the global average of 74 kg. This results in a total of 4.5 million tonnes of food being wasted in Uganda annually. Urban areas tend to waste less food than the rural areas. In Kampala, for example, the average household food waste

generation was 89 kg/person/year. Food waste was segregated by income status and ethnicity. Low-income earners generally generate less food waste (74.9 kg/person/ year) compared to middle (111.35 kg) and high-income (179.82 kg) earners, mostly because of the types of foods that dominate their diets (UNEP, 2021). Low-income earners mainly eat foods prepared from grains and cereals like millet flour, maize flour, rice, beans and g-nuts, which are not always associated with inedible food waste. Middle and high-income earners have higher value food waste because their diets contain a variety of fresh foods like green banana, fruits (dessert banana, watermelons, mangoes, oranges etc.), cassava, potatoes and sweet potatoes. These products have huge quantities of inedible waste and go bad easily. Households of similar income statuses may generate more or less food waste than the category average depending on their ethnicity, affecting their dietary preferences. As an example, the Bantu group (Bakiga, Banyankole, Baganda) tends to produce slightly more food waste than category averages because green bananas are a major feature in their diet, while other ethnic groups, like Lango and Acholi, eat much more cereals.

## 6.2 Enabling environment

### 6.2.1 Institutional environment

The institutional framework of the food system encompasses a network of various government Ministries, Departments and Agencies, NGOs, research institutes and other stakeholders. The Ministry of Agriculture, Animal Industry and Fisheries plays a prominent role in the formulation and implementation of a number of agricultural policies. In addition, the Ministry of Trade Industry and Cooperatives (MTIC) and the Ministry of Health, Water and Environment work on developing solutions for the bottlenecks in the food system. The National Planning Authority is responsible for designing and implementing national development plans, including those related to food security, agriculture, livelihoods and rural development. The Uganda National Bureau of Standards, which is part of the MTIC, sets standards for food safety and quality, and promotes local and international trade. The National Environment Management Authority is involved in conservation of environment, and deals for example with issues around land conversion and deforestation. Entities like the Office of the Prime Minister (OPM) work to improve nutrition outcomes by coordinating multisectoral efforts and

promoting nutrition-sensitive interventions through operationalising the objectives of the Uganda Nutrition Action Plan (UNAP). International organisations like the FAO, WFP and IFAD work in partnership with the Ugandan government to provide technical expertise, funding and support for food and agricultural programmes. Various research institutes across the country, like the National Agricultural Research Organization (NARO), National Crops Resources Research Institute (NaCRRI), Kyambogo University and Makerere University, conduct research into the current challenges of the food system and opportunities for innovation. They also contribute to improved dietary intake by developing nutrient dense crops like iron-rich beans and orange-fleshed sweet potatoes.

The role of local governments in improving food security and the business environment for supporting the development of the private sector is limited in most districts. This is related to the challenges in creating an enabling environment for the private sector and in fuelling job creation and economic growth. At lower institutional levels (i.e. farmer cooperatives and farmer associations) the organisation of farmers is limited. Focus of these cooperatives and farmer associations are largely on locally produced food and animal products with very limited value additions that could fetch additional income for farmers and other stakeholders in individual value chains.

Uganda is a democratic republic with a governance system comprised of national and local governments. The constitution enables a system of decentralisation and local governments, which is further consolidated in the Local Governments Act 1997 (Cap. 243). In urban settings, there are councils for cities, municipalities, divisions/towns, wards and cells. In rural areas, there are district councils, counties (which are administrative units without councils), sub-county councils, parish councils and village councils. The Local Governments Act provides for a minimum of 30% of council seats to be reserved for women and, in 2013/14, local government expenditure was 15.1% of total government expenditure. The primary source of revenue is transfers from the national government. However, local governments also raise revenue locally through property taxes, licences and user fees. Responsibility for transport and environmental protection is shared between national and local governments. Districts and municipal councils are also responsible for the provision of primary and secondary education, safe water supplies and public health, and they are encouraged to entrust certain services to

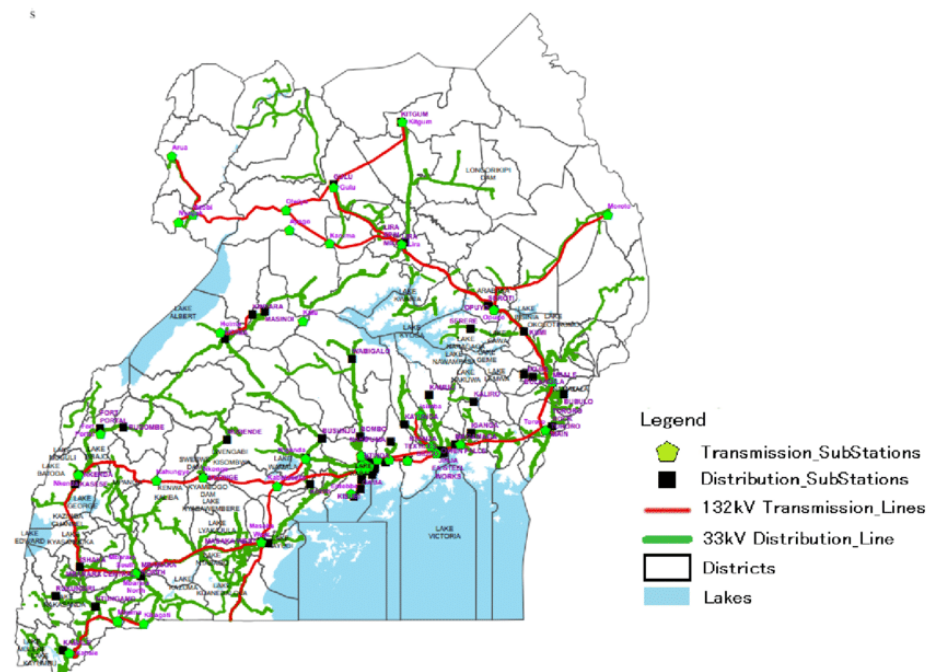
the lower tiers. Local economic development is the responsibility of the districts and lower tiers of government.

### 6.2.2 Supporting services and infrastructure

Uganda faces substantial food losses due to poor post-harvest handling practices and inadequate infrastructure. On average, an estimated 30-50% of the annual grain, fruits and vegetable harvest is lost annually (FAO,2019) due to unsustainable systems for the distribution and storage of food. Common practices like storing agricultural produce in unsuitable containers (e.g. non-hermetic bags or sacks) renders the produce vulnerable to issues like weevil damage and mould (EPRC, 2018).

Only 16% of Uganda national road network is developed, yet 95% of the food is transported by road. Underdeveloped national and international railways, water and air transport networks for food distribution contribute to the inefficiency of food distribution. As a result, food aggregation, transportation, storage and distribution primarily rely on informal, small-scale operators (FAO, 2023).

Uganda has made significant improvements in the provision of electricity. Twenty years ago, the electricity network in Uganda was poorly developed, reaching only 1.6% of the population compared to 11.8% in other sub-Saharan African countries. Currently, 35.9% of the population has access to electricity, which is above the average of 30.4% for other sub-Saharan African countries. However, in some rural communities, especially those detached from trading centres, there is limited or no access to electricity, which has deterred the spread of economic development to such areas. Figure 28 shows that the electricity distribution lines (in green) are mainly around urban areas. Evidently, access to electricity is poor in economically disadvantaged regions like the northern region (EPRC, 2018). In terms of absolute numbers, Uganda ranks fifth among countries with access deficits worldwide, with approximately 25 million people affected (IEA, 2023).



**Figure 28** Electricity grid in Uganda and sub stations  
Source: Miito & Banadda (2017).

Extension services in Uganda play a crucial role in supporting smallholder farmers by providing them with essential agricultural information, training, and resources to improve their productivity and livelihoods. Housed under MAAIF, the Directorate of Agriculture Extension Services is responsible for coordinating agricultural extension service delivery nationwide, both in the public and private sectors. However, the ratio of extension workers to farmer households was only about 1:1800 in 2019, significantly below the internationally accepted ratio of 1:500, hampering agricultural productivity (MAAIF, 2019). Efforts are underway to address this gap, with plans outlined in the national agricultural extension strategy to drastically increase the number of extension workers. In addition, the ministry is collaborating with FAO to institutionalize farmer field schools within the extension service delivery system and higher education institutions, aiming to strengthen agricultural knowledge dissemination and capacity building. Despite



these efforts, budget allocations for extension services are declining, as revealed by an analysis by EPRC (2023).

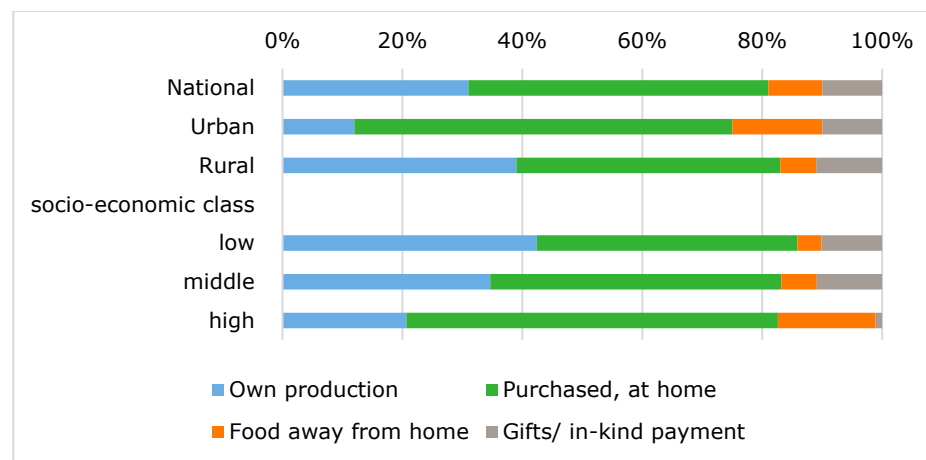
The Uganda National Agro Input Dealers’ Association (UNADA), established in 2003, is a pivotal organisation that oversees agricultural input, such as seeds, fertilisers and farm equipment. UNADA believes that private agro-input dealers drive the modernisation of Uganda’s agriculture, aiming to enhance food security and crop yields. It collaborates with various entities such as government agencies, seed suppliers, farmer associations, cooperatives and international organisations involved in agricultural projects. Makerere University’s Faculty of Agriculture ensures comprehensive training for agro-dealers. UNADA’s activities focus on promoting quality inputs through commercial distribution networks and connecting agro-dealers with farmers. However, the 2014 Budget Monitoring and Accountability Unit report identified significant challenges in the distribution of agricultural inputs in Uganda. These encompassed issues like mismanagement by local governments, loss and theft of inputs, delayed distribution, pest and disease outbreaks, political interference, inaccurate weather forecasts, poor input quality, accessibility barriers and delayed fund allocation.

The Ugandan government established an Agricultural Credit Facility (ACF) in partnership with select financial institutions. Its aim is to offer medium and long-term financing for agricultural projects, particularly for agro-processing, commercialisation and value addition. Loans are facilitated through participating financial institutions, guided by the Bank of Uganda and the Ministry of Finance, with borrowers providing machinery and equipment as security. However, the ACF currently excludes most smallholder farmers affiliated with SACCOs, which presents a challenge in terms of accessibility. Additionally, in 2016, the government launched the Uganda Agricultural Insurance Scheme (UAIS) to protect farmers against losses from natural disasters. The UAIS operates as a public-private partnership with ten insurance companies that offer agricultural insurance. The government subsidises premiums, conducts public awareness campaigns and provides farmer training through this scheme, overseen by the Uganda Insurance Regulatory Authority. The UAIS aims to foster credit financing from commercial banks while safeguarding farmers from agricultural risks. The extent of farmers’ access to agricultural insurance and medium to long-term credit remains unclear.

### 6.2.3 Food environment

Dolislager et al. (2022) conducted a comprehensive analysis of food sources in both rural and urban areas of Uganda, drawing on survey data from 3,000 households. The results are summarised in Figure 29. Nationally, food purchased for consumption at home covers half of total food expenditures. In rural areas, the share of own produce constitutes almost 40% of the total food expenditure at household level, while it is only 12% for urban households. When compared to other countries analysed in the study, the importance of own production as a food source is higher for Uganda, which has a share of 17% and 25% for Nigeria and Tanzania, respectively.

Segmenting the population into three socio-economic classes reveals a decreasing significance of own production as food source decreases as income increases. Additionally, the share of food purchased for eating outside the home is nearly four times higher for the highest socio-economic class compared to the lowest.



**Figure 29** Contribution of different food sources to total food on household level

Source: own compilation based on Dolislager et al. (2022).

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The above statistics signify the important role of food market in shaping the food environment and influencing food choices, purchasing requests and consumption habits. However, little is known about the status of food marketing in Africa. Dia et al. (2021) described the food and beverage environment in the vicinity of schools in Kampala; they discovered that, out of 1,034 branded advertisements, 86% promoted unhealthy products, mostly sugars-sweetened beverages (512%) and alcoholic beverages (23%). The number of advertisements for unhealthy foods was higher in urban areas compared to peri-urban areas. Spires et al. drew similar conclusions (2020) in their comparison of urban and rural food environments in Sweden, South Africa and Uganda, representing high, medium and low income countries. Of all three countries, Uganda had the highest number of in-community adverts for unhealthy products. No advertisements promoting a healthy lifestyle were found. Moreover, Uganda had the lowest level of consumer guidance, like assisting consumers with smart packaging to make healthy choices.

#### 6.2.4 Household, gender and sociocultural dynamics

About two-thirds of all employed women work in agriculture, primarily in subsistence farming. Socio-cultural factors constrain resources needed to grow commercial crops and effectively limit the role of women in agriculture. In Uganda, pervasive social norms dictate that women are tasked with providing sustenance for the family, leading them to focus on cultivating subsistence crops. Conversely, men often engage in the cultivation of cash or commercial crops. Factors like lower levels of wealth, education and ownership of assets limit the participation of women in commercial farming, which in turn affects overall agricultural productivity. Gender-based roles and responsibilities often lead to unequal access to resources and decision-making power within households. Women, who typically bear the responsibility for food production and preparation, may have limited control over income or land, affecting their ability to provide nutritious meals. In addition, cultural practices that perpetuate inequality between men and women persist. This intersection of tradition and inequality poses a formidable barrier to achieving lasting socio-political change. In adulthood, women are still treated as second-class citizens both in the public and private spheres. Traditionally, household tasks are extremely gendered, with wives being expected to manage the children, prepare meals, wash laundry, clean house, cultivate crops and even

generate additional income work outside the home. Meanwhile, men are not expected to take nearly as many responsibilities, however, they are considered the primary financial providers and heads of the household. This can result in women and children being more vulnerable, exposing them to a higher risk of experiencing malnutrition.

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## 7 Food System dynamics

To understand the complexity of the Ugandan food system and the interaction and feedback mechanisms within the system, it is essential to draw links between the various elements of the food system. Based on the facts and data presented in the previous chapters, we have developed various schematic causal loop diagrams (CLD) of the Ugandan food system.

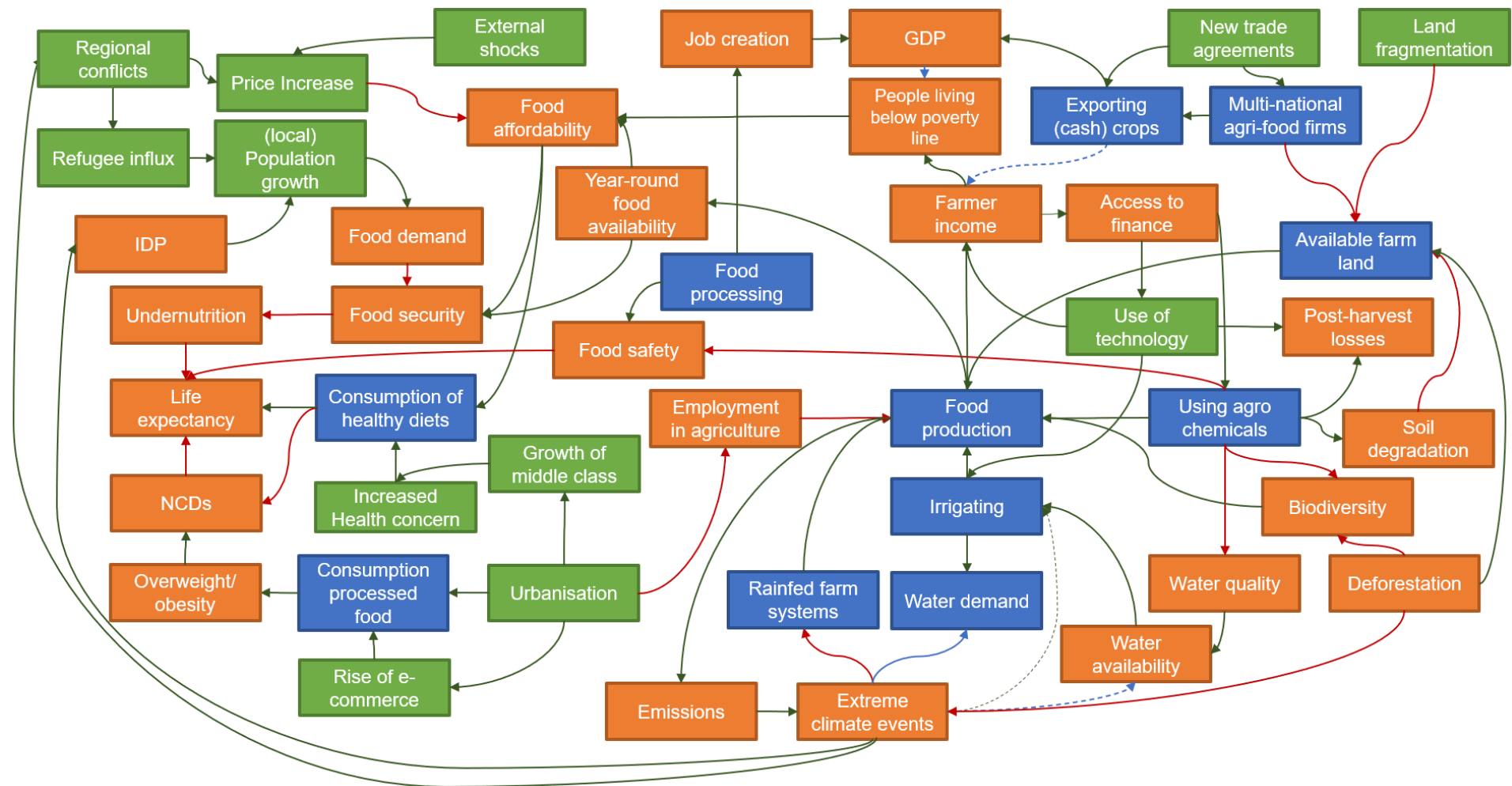
Causal loop diagrams are graphical representations used in system thinking. These diagram can help by identifying possible leverage points and unintended consequences, enabling policymakers and other stakeholders to design more effective interventions and policies for enhancing food security, sustainability and resilience.

Causal loop diagrams are comprised of two elements: variables and links between them that indicate their interconnectedness. These variables align with drivers (green), activities and their context (blue), and the outcomes (orange) mentioned in the previous chapters.

The arrows represent the links between the various variables. Green arrows indicate positive links, meaning they move in the same direction; when one variables increases, the linked variables increase as well, or when one decreases, the other decreases too. Red arrows illustrate negative links, indicating that the two variables move in the opposite direction; if one decreases, the other variable increases.

Dotted lines represent indirect relationships, used when the relationship between variables is not straightforward but influenced by other factors. This means that the direction of the relationship between the variables is affected by the context, i.e. depending on the presence of a third intervening variable.

An overarching CLD is presented on the next page, figure30, which shows the complexity of the food system in the Ugandan context. This diagram can be broadly be divided into three domains: variables related to food and nutrition security on the left, socio-economic variables on the upper right, and environmental environments on the lower right.



**Figure 30** Schematic causal loop diagram of Ugandan Food system

Note: Drivers [green], activities and their context [blue], outcomes [orange]; Positive causality [green arrows], negative causality [red arrows]; direct relationships [solid arrows], indirect relationship [dotted arrows].

Source: own compilation, based on workshop with outputs.

## 7.1 Food security and Nutrition

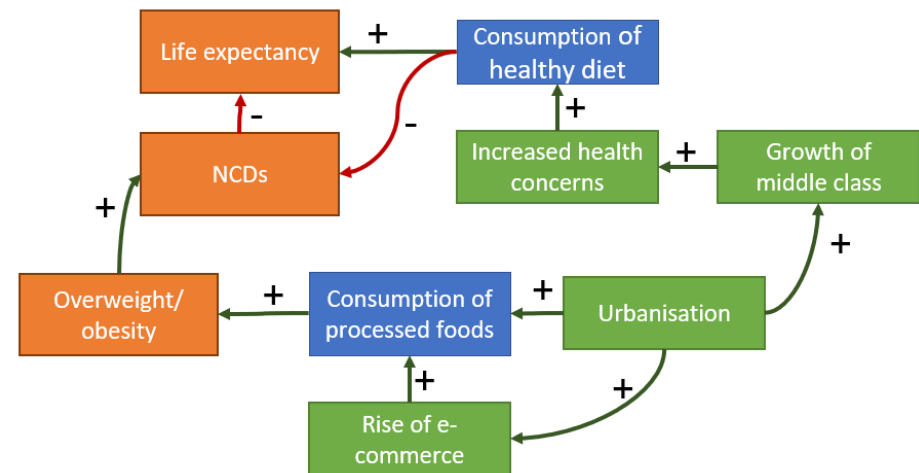
### 7.1.1 Urbanisation

Urbanisation has greatly affected Uganda’s food system, altering factors like food availability, access and utilisation. As urbanisation progresses, food environments undergo notable changes that have implications for food security, dietary patterns and agricultural practices. Urban areas have a higher prevalence of formal food outlets, while rural areas rely more on informal food retail outlets. In most urban food environments with supermarkets, food vendors and restaurants, the availability and diversity of healthy foods is higher, with shops selling fresh fruits, vegetables and animal-based products year round. However, these products are unaffordable for large parts of the urban population. Accordingly, there are two distinct causal pathways between urbanisation and nutrition, determined by factors like income. For the part of the population that benefits from the increased economic activities that come with urbanisation, urbanisation can promote healthy diets due to the improved incomes and availability of healthy foods. Moreover, studies have shown that nutritional knowledge and motivation to adopting a healthy diet is higher in urban areas compared with rural areas (Kolliesuah et al., 2023). However, for the poor part of the population, healthy food is unaffordable, nor do they have the resources to produce some fruits and vegetables themselves in contrast to rural households, which are mostly able to consume a certain amount of privately produced fruits and vegetables at various points in the year (Yiga et al., 2021). To cope with financial barriers, priority is given to foods that are perceived as having a high satiety values, like carbohydrate staples. This financial barrier may, however, present an opportunity for urban agriculture in which households can grow fruits and vegetables in sacks and containers and thus have all-year-round access to these nutritious commodities.

Urban food environments can often be classified as obesogenic environments that promote weight gain due to the high availability of fast-food restaurants and advertisements for sugar sweetened beverages and ultra-processed foods. Factors like taste, convenience and time constraints are major drivers for food consumption (Ayo et al., 2012). A study amongst adolescent students in Kampala found social pressure and acceptance as reasons for purchasing fast food, as western food was perceived as prestigious (Brodin, 2020). Urban citizens prefer

to order food or dine out rather than prepare meals at home, and this is related to the consumption of high caloric meals (Ayo et al., 2012). Urbanisation also leads to more sedentary lifestyles, with office jobs and changes in transportation modes.

On average, urbanisation is associated with an increase in the consumption of animal-source foods, sugar, fats and oils, refined grains and processed foods (IFPRI, 2017). Consuming unhealthy food and beverages in combination with low physical activity can lead to weight gain and other chronic conditions that put people at higher risk of at least 13 types of cancer, including endometrial cancer and breast cancer in postmenopausal women (Riha et al., 2014). The increasing prevalence of obesity is worrisome as it feeds directly into the triple burden of malnutrition.



**Figure 31** CLD of the interactions between elements related to urbanisation, nutrition and health

Source: own compilation, based on workshop with outputs.



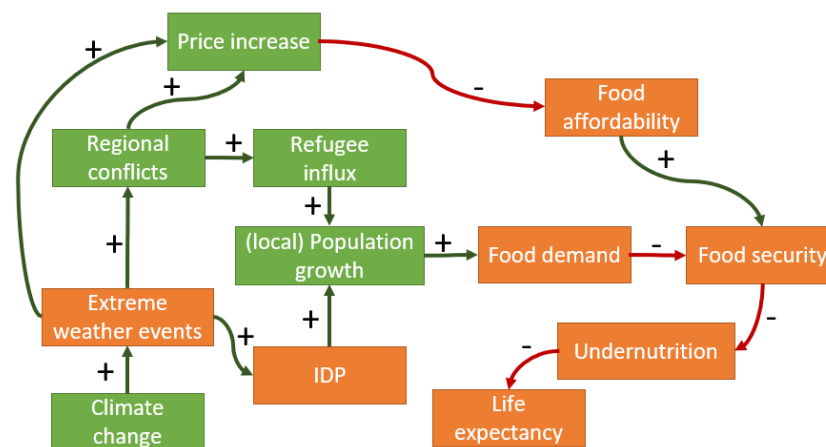
### 7.1.2 Climate, conflict and food security

Regional conflicts significantly affect food security, particularly in the northern parts of Uganda where long-standing conflicts have disrupted the region's food system. This disruption has resulted in widespread food insecurity and malnutrition. The displacement of millions of people has disrupted agricultural activities due to forced migration (IPC, 2022). Despite the Ugandan policy that stipulates each refugee household is given a plot of land to cultivate or pasture, food insecurity is high amongst refugee households (FAO, 2019). Furthermore, the destruction of infrastructure, including that of food production and distribution systems, has worsened food insecurity in conflict-affected areas (Wichern et al., 2017). Social and cultural factors also play a role in food security in areas affected by conflict. For example, a study by Black et al. (2019) revealed that Intimate Partner Violence (IPV) is a significant issue in conflict-affected zones in northern Uganda, and this has implications on the wellbeing and food security of women and their families (Black et al., 2019).

Food insecurity can be a both result and a driver of conflicts. A study in the Karamoja cluster identified competition for access to land and water, and cattle rustling as major causes of conflict in the area (FAO, IGAD, et al., 2023). Generally, conflicts tend to escalate during times of scarcity, such as failed harvests. This highlights the correlation between climate change and conflict: each amplifies the other. Climate change is linked to critical drivers of conflicts, like resource competition, disruptions of livelihoods and food insecurity (Kikoyo & Nobert, 2015). Climate change can also worsen the consequences of conflicts by restricting mobility, which is an important coping strategy for climate events.

Due to the causal link between climate change and conflict, climate change can contribute to increases in refugees. Simultaneously, climate change is directly related to internal displacement, particularly in regions susceptible to climatic events. The World Bank projects that, without concrete climate and development, around 12 million Ugandans could be internally displaced by 2050 due to the gradual effects of climate change (Rigaud et al., 2021). An influx of refugees or internally displaced people would lead to an increase in local food demand, and this could lead to price shocks, threatening the food security situation of host areas. The identified correlations underscore the complex interplay between conflict, food security, climate change and migration resulting in a self-reinforcing feedback loop. The population increases that result from refugee influxes could

also present opportunities for increased farm labour and, if leveraged, they could contribute to increased production and productivity, thus alleviating food insecurity.



**Figure 32** CLD visualising the interface between conflicts, climate change and food security

Source: own compilation, based on workshop with outputs.

## 7.2 Socio-economic factors

### 7.2.1 Land and farmer income

Land is important for farmers to earn decent incomes. Uganda's population is rapidly growing, increasing the demand for land. In Uganda, there is a practice of land being inherited equally amongst siblings, resulting in land fragmentation and farmers having small plots of land. Land fragmentation and insecure land rights impede farmers from investing in sustainable land management practices because they mean that farmers cannot be sure of recouping benefits from investment in land (Mwesigye & Mildred, 2021). This discourages farmers from adopting agricultural innovations and hampers overall agricultural development. The lack

of crop diversity makes farmers more susceptible to market fluctuations and reduces their overall income potential, which influences their quality of life and living conditions, particularly for grain farmers (Morrissey et al., 2023).

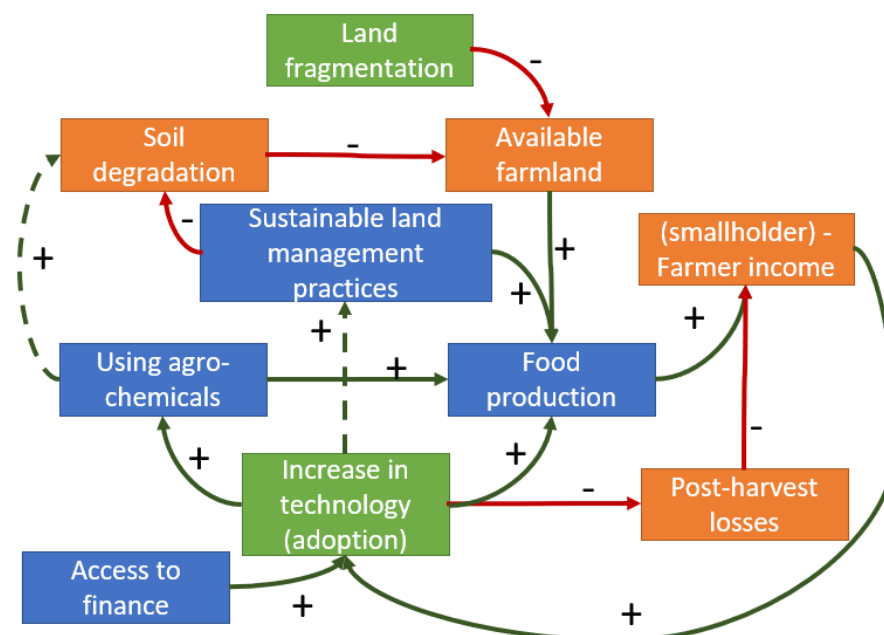
Given the limited size of their plots, farmers strive to intensify land use to secure decent incomes. The use of agrochemicals has increased rapidly in Uganda (FAO, IGAD et al., 2023). The use of agrochemicals (e.g. fertilisers, pesticides) can boost farm productivity in the short term but can have negative consequences when overused (indicated by the green dotted line in the diagram). Agrochemicals kill symbiotic natural microflora in the soil, leading to losses in biodiversity and, consequently, soil fertility (Abeja, 2023). Moreover, some microbes develop tolerances to chemicals over time. The high incidence of antimicrobial resistance means farmers require more chemicals to kill agricultural pests and treat diseases; this increases the risk of becoming trapped in a vicious cycle of excessive agrochemical use. In the long-term, this has a negative impact on farm productivity.

One positive development that might foster the income of smallholder farmers are the developments in ICT and e-commerce. Adoption of technology and e-commerce have positive effects on farmers' incomes (Li et al., 2021; Sheng et al., 2021). When applied appropriately, technologies can support sustainable land management practices (indicated by green dotted arrows). Modern technology primarily improves agricultural yields, enhancing farmers' income levels both directly and indirectly (Khan et al., 2022). Technology can also reduce post-harvest losses and promote farm level processing, both of which can improve farmers' incomes (Eriogou et al., 2019). Since increased incomes lead to more opportunities for farmers to invest in innovation and technology, a positive feedback loop can be observed between technology adoption and farmers' incomes. Income diversification through off-farm work has been found to be inversely related to farm investment (Anang, 2017).

Farmers have used mobile phones to receive timely weather forecasts, market prices and agricultural information through mobile apps, SMS services and social media platforms. This information enables farmers to make informed decisions about planting, harvesting and accessing profitable markets for agricultural produce. Using mobile payments, Ugandan farmers can access financial services, allowing them to save, borrow and make transactions without the need for

physical banks. This promotes financial inclusion and provides farmers with greater control over their finances. Nonetheless, digital financial services are often disrupted by network and internet connectivity issues. Users of digital financial services often cite frequent service outages due to lack of internet connectivity (Research ICT Africa, 2023).

In conclusion, the challenges posed by land fragmentation and insecure land rights in Uganda hinder agricultural development and constrain farmers' income potential. Yet, by prioritizing sustainable land management practices and embracing digital innovation, promising pathways emerge for smallholder farmers to improve their livelihoods while preserving the environment. To address these challenges effectively, implementing land reform policies, reducing reliance on agrochemicals, facilitating access to and adoption of technologies, and enhancing financial inclusion are critical leverage points.



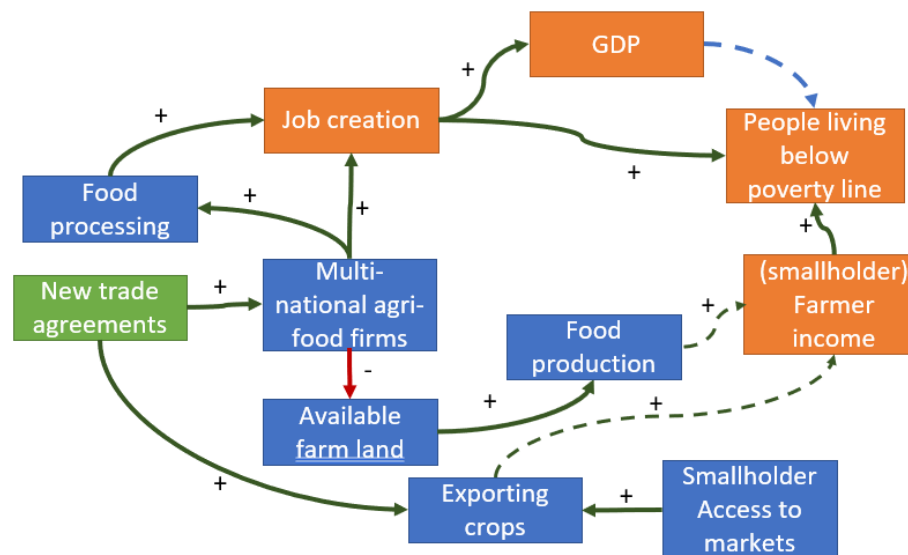
**Figure 33** CLD visualising the interaction between land fragmentation, farmer income and use of technology/inputs  
 Source: own compilation, based on workshop with outputs.

## 7.2.2 Commercialisation of agricultural sector

Regional trade agreements have made developing countries like Uganda more active participants in international trade. Stable trade relations are crucial for exporters' economic planning and importers' supply security, as recent trade disruptions have shown. There are a number of initiatives that the Ugandan food systems can tap into to improve poverty alleviation, economic development and food system transformations. For instance, the African Continental Free Trade Agreement (AfCFTA) can be leveraged to increase regional trading opportunities and ultimately alleviate poverty among the Ugandan population. Through agri-food firms, the private sector can drive innovation in products, processes and marketing to increase sales, enter new markets and enhance product quality.

However, the commercialisation of the agricultural sector could lead to adverse consequences for smallholder farmers. The Ugandan government actively seeks foreign investment to promote the commercialisation of agriculture. However, the allocation of extensive land areas to foreign companies sometimes results in 'land grabbing' practices. While such initiatives may bring economic benefits at the national level, they significantly affect the livelihoods of local farmers. Despite potential job creation by multinational businesses, local communities often face challenges in earning a decent income, due to the low-wage jobs at plantations as illustrated by the case of Kalangala, described in chapter 4.3. Consequently, precautions should be taken to avoid negative implications from such initiatives on the livelihoods of the local communities. Additionally, the loss of access to natural resources for local communities has led to a reduction in local food supplies, contributing to elevated food prices.

It is crucial to address smallholder farmers' needs to ensure inclusive agricultural development, e.g. by enhancing access to (new) markets for smallholder farmers (indicated by green dotted arrow). Otherwise, commercialisation of the agricultural sector may not only hamper local livelihoods, but it also risks exacerbating existing inequalities. Encouragingly, the implementation of initiatives like the Community Agricultural Infrastructure Improvement Programme, Project-1 (CAIIP-1), has yielded significant benefits, including notable improvements in road infrastructure. As a result, farm gate prices for staple crops have increased (ADB, 2015). Additionally, transportation costs and travel times to major towns have decreased by 50%. Furthermore, post-harvest losses, particularly for perishable goods have decreased by approximately 20%.



**Figure 34** CLD visualising the interactions between elements related to the commercialisation of the agricultural sector and farmers' income  
 Source: own compilation, based on workshop with outputs.

## 7.3 Environmental factors

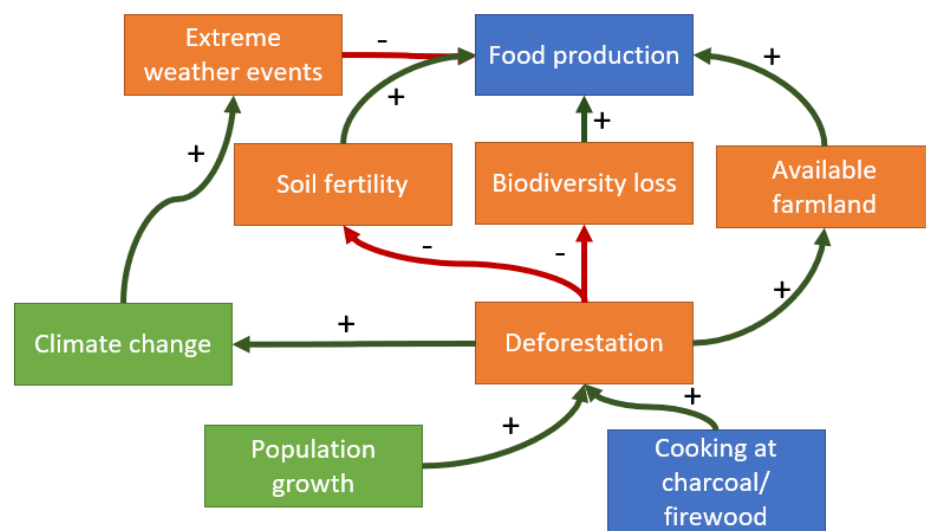
### 7.3.1 Deforestation

The global trend of deforestation is also prevalent in Uganda as explained in chapter 4.3. The main causes of deforestation are vegetation clearance to expand available farmland and cutting down trees for firewood and charcoal (Babigumira et al., 2014; Jagger & Kittner, 2017). Deforestation contributes to soil erosion and loss of biodiversity through the removal of vegetation cover, disrupting the natural balance and stability of ecosystems. While deforestation may temporarily benefit food production by expanding agricultural land, it will hamper soil fertility and, consequently, food productivity on the long-term.

Forests can also play an essential role in food provisioning for local communities. Some of these foods (e.g. indigenous fruits and vegetables) provide year-round

sources of essential micronutrients to local communities. A study in Cameroon showed that 47 unique forest foods were consumed by communities that lived near forests. These contributed approximately half of women’s total daily energy intake, 93% vitamin A, 85% iron, 88% zinc and 89% calcium (Fungo et al., 2016). Accordingly, the loss of forest foods has a significant effect on the food and nutritional security of surrounding communities.

Furthermore, deforestation is a significant contributor to climate change. Trees act as carbon sinks, absorbing carbon dioxide and storing carbon in their biomass. Loss of tree cover leads to increased release of greenhouse gases and affects temperature, humidity and precipitation patterns. This has a negative effect on food production, especially among smallholder farmers who have limited ability to adapt to these changes. Accordingly, sustainable land use practices, reforestation initiatives and the protection of critical habitats are imperative for sustainable food systems.



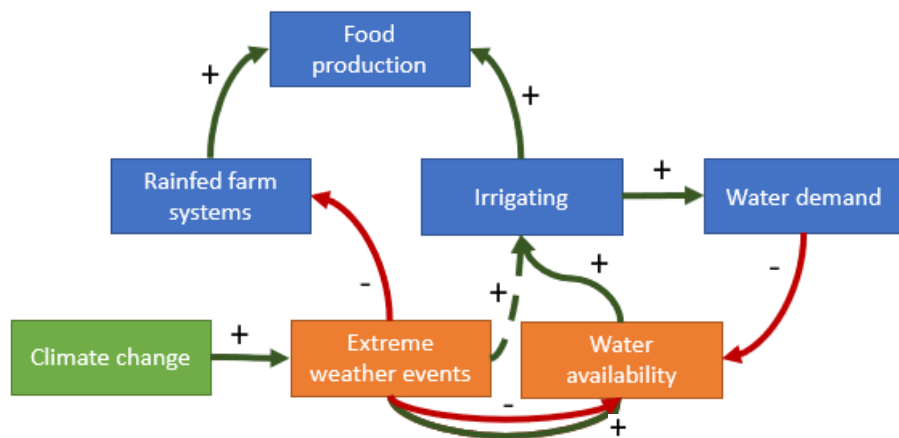
**Figure 35** CLD visualising the interactions between drivers, activities and outcomes related to deforestation

Source: own compilation, based on workshop with outputs.

### 7.3.2 Water

Water is crucial for food security as it plays a fundamental role in various aspects of agricultural production. 17% of the total surface area of the country is covered by water and swamps, yet a significant portion of the country’s food production relies on rain-fed agriculture (GOU et al., 2007; World Bank, 2021a). This predisposes agricultural systems to seasonality and adverse effects from extreme weather conditions (Mubiru et al., 2012). This negatively affects food production and threatens the food security of the entire region.

Extreme weather events have led to droughts and severe water shortages, especially in northern Uganda, further affecting the rain-fed farm systems. This has led to famines and extreme hunger. This has necessitated investment in irrigation systems (illustrated by the green dotted arrows). However, irrigation would increase water demands and lead to regional tensions further down the Nile river. In addition to the projections on droughts, regional climate models project an increase in rainfall in the region (Christensen et al., 2007), with widespread and potentially devastating changes taking place in terms of the frequency, intensity, distribution and predictability of rainfall. This could lead to overabundance of water in certain periods of the year (through floods/heavy rainfall) and cause extensive damage to the country’s infrastructure, settlements and food production. Heavy rainfalls could potentially compensate for expected droughts. With proper infrastructure for water storage, such as reservoirs and dams, excess rainfall can be collected during rainy seasons and stored for use during dry periods, mitigating the impact of droughts on agricultural production. Addition, increased rainfall can replenish groundwater reserved, which can then be tapped for irrigation purposes. By investing in water management infrastructure and practices Uganda can enhance its resilience to climate change-induced droughts and sustain agricultural productivity.



**Figure 36** CLD visualising the interaction between climate change, water and food production

Source: own compilation, based on workshop with outputs.



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# 8 Conclusions

This map of the Ugandan food system shows that, while Uganda is on track to achieve a large number of its desired food system outcomes, many social, economic and environmental challenges in the food system persist. Some of the key drivers of the food system (e.g. high population growth, instability in the region, climate change) affect the system's potential to deliver positive food outcomes in food security, the economy and the environment.

## Food system outcomes

While stunting, wasting and underweight levels have declined over the past few decades, food security varies significantly between regions in Uganda. In the northern region, the Karamoja region and refugee settlements face acute food insecurity. Food insecurity is responsible for 1.8 million cases of stunting in Uganda.

The country's poverty rate has declined over three decades, and the average lifespan improved from 48 years old in 2000 to 60 in 2021. However, 21% of people still live in poverty, including many of the country's smallholder farmers.

While over 90% of Uganda's energy comes from renewables, the use of firewood and charcoal for cooking is a major cause of deforestation, threatening Uganda's rich biodiversity. Uganda is undergoing increased negative effects from climate change and variability, such as droughts, floods and landslides.

## Food system drivers

The population of Uganda in 2024 is estimated to be 50 million and, with a 3.2% growth rate, it is expected to reach 100 million by 2050. High birth rates and increasing wealth and urbanisation are expected to quadruple food demand by 2050.

Farmers, especially smallholders, face challenges in accessing improved technology and quality agro-inputs, leading to reduced productivity and food shortages.

Urbanisation and economic growth are causing more people to adopt western diets and eat more processed foods. This shift is associated with increased levels of obesity and a range of diet-related health problems.

Climate change is increasingly affecting Uganda's food system. Extreme droughts in vulnerable areas in the north and extreme floods and landslides in the Mount Elgon and Rwenzori regions have worsened the risk of food insecurity.

As a result of COVID-19, purchasing power has diminished, food costs have fluctuated and vulnerable communities have faced economic hazards. The war in Ukraine affected the prices of food, gasoline and fertiliser globally. This has affected household incomes, local markets and agricultural output.

## Food system activities

Agriculture employs more than half of Uganda's households and accounts for more than 20% of the Gross Domestic Product (GDP). At the same time, productivity and income levels of the smallholder farmers remain low.

In Uganda, the agro-processing industry contributes 60% of manufacturing output, of which food processing accounts for 40%. Most agro-processing companies do not run at full capacity. Although 36% of the population now has access to electricity, shortages in rural areas impede economic growth.

Only one third of crop production is marketed, and less than 7% is exported. Most farmers (85%) sell crops in local markets directly. Informal markets are pivotal for food access for both rural and urban areas, serving both the poor and wealthier populations.

Rising incomes have lowered poverty rates and influenced food consumption patterns in Uganda. In addition to incomes and prices and household demographics, changes in lifestyles, such as urbanisation and home-production, shape consumption.

Higher incomes are correlated with higher expenditure on highly processed meals. In urban Uganda, fruit and vegetable consumption is low and affected much more by educational status than by household income.

Due to inadequate infrastructure and poor post-harvest techniques, Uganda struggles with significant food losses. Efficient food distribution is hindered by inadequate road networks (16% developed) and restricted transport options.

### Food system dynamics

In this food system analysis, a range of important dynamics between food system drivers, activities and outcomes are highlighted. They relate to urbanization, refugees, land fragmentation, regional trade, deforestation and climate change.

To the Ugandan food system, urbanisation is a double-edged sword: on the one hand, it is associated with higher consumption of processed and unhealthy foods, leading to more overweight, obesity and related NCDs. On the other hand, the middle class, highly educated consumers in cities have higher health concerns and are more likely to consume healthy diets.

In the north of Uganda, the influx of refugees due to regional conflicts has put more pressure on food supply. Coupled with increasing droughts due to climate change, this has led to high levels of food insecurity and undernutrition.

Land fragmentation is reducing the size of land available to farmers, in turn reducing their overall earning potential and ability to invest in technology and inputs that would increase farm productivity.

While regional trade agreements have improved Uganda's ability to export and attracted investment of multinational agri-food firms, the commercialisation of the agricultural sector risks the loss of access to land and natural resources for local communities and smallholder farmers.

Fast population growth and persistent reliance on firewood and charcoal for cooking has accelerated deforestation, with 40% of forest cover being lost over the past ten years. While deforestation often increases available farmland, it lowers biodiversity and contributes to global climate change.

Climate change, in turn, leads to increasing extreme weather events, leading to increased rainfall and floods in some areas of the country. However, this is increasing the occurrence of droughts in other areas, in turn increasing the need for irrigation in traditionally rainfed farm systems.

### Implications of this analysis

This analysis of the drivers, activities and outcomes of the Ugandan food system and the key dynamics between these elements has five key implications for Uganda's food system transformation agenda.

1. The quadrupling of food demand over the coming 25 years poses a major challenge to the Ugandan food system, requiring a delicate balancing act between commercialising agriculture and securing rural livelihoods.
2. The growing effects of climate change and extreme weather events, if not addressed by far-reaching climate adaptation measures, will put the potential of Uganda to feed its own population at significant risk.
3. While stunting, wasting and undernutrition have improved over the past decades overall, large regional inequalities in food security need to be addressed if a positive trend in food security is to materialise.
4. Urbanisation and related trends regarding westernised diets are putting Ugandans at risk of increased rates of overweight. Interventions in food environments and consumer behaviours are needed to combat obesity.
5. Improvements in Uganda's road, market, storage and cooling infrastructure are essential to improve food safety for consumers and to reduce food waste and losses throughout the value chain.

These policy implications show the need for an integrated, systematic approach to addressing Uganda's food system challenges. Bridging the silos of agriculture, food security, health and environment is necessary to achieve a more sustainable, healthy and inclusive food system.

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