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Food security in a context of war, mineral rush and population explosion: The case of Bukavu, Eastern DRC

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CRediT statement:

- **Bossissi Nkuba**: conceptualisation, methodology, writing, review, project management
- **Liliane Nabintu Kabagale**: literature review, methodology, investigation, data analysis, writing
- **Ayagirwelarha Cishibanji**: literature review, methodology, investigation, data analysis, writing
- **Pacifique Mwene-Batu**: conceptualisation, methodology, review, project management
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Abstract

In cities where high birth rates are coupled with massive immigration due to violent conflicts, reaching and maintaining food security can be challenging. This gets worse when local food production is lowered by the exodus of farming communities, low yields, and poor roads hindering access to fertilisers and pesticides, with more governmental focus on the mineral sector. In Bukavu, as in similar cities, the local community finds ways to cope with such challenges through food importation, but they often become prey to producers of highly processed and nutrient-poor foods. To analyse the challenges these conditions pose to food security and access to healthy diets, and to explore potential paths forward for a city amidst a mineral rush, population boom and ongoing conflict, we employed a mixed-methods approach. Through focus group discussions (with nutritionists, urban planners, policymakers, local authorities

and private-sector actors, academics and consumers), key informant interviews (with users and providers of both formal and informal food services), and a literature review (to map relevant actors and existing research on food security, nutrition and health policies), we attempted to better understand food security, its policies and factors influencing its status in the city. Results showed that low household income, low agricultural productivity, inflation, poor road conditions, ongoing conflicts and the mineral rush negatively affect food availability and the food environment in Bukavu. Despite the absence of a clear political will and poor state authority, coupled with corruption, there is a small effort to improve food availability by the government and its partners.

Keywords: Violent conflicts, mineral sector, food security, informal settlements, Bukavu

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Executive summary

This working paper presents the findings of research into the condition of health, wellbeing and nutrition (HWN) in Bukavu, Democratic Republic of the Congo (DRC). It provides a novel analytical framework for examining the vulnerabilities of food systems, especially food availability, in cities experiencing prolonged conflict, population booms and extractivism. The study was carried out as a component of a larger research project funded by the African Cities Research Consortium (ACRC), which aims to provide evidence and assist coalitions of urban reformers in their efforts to collaboratively address complex issues in African cities.

Local context

Bukavu is one of the five largest cities in the DRC. It is the capital and largest city of South Kivu Province, located in the east of the DRC. It has a population of approximately 1,250,000 (nearly 20% of the province's population) within an area of 60km² (out of the province's 65,000km²). It is divided into three municipalities (*communes*) further divided into a total of 13 neighbourhoods. Of the 13 neighbourhoods, two host the richest part of the population and most of the city's economy. Also, in addition to these formal neighbourhoods, due to displacement, many informal neighbourhoods have been created around the city. Indeed, due to the three-decade-long conflicts in the Eastern DRC, the city has had to play the role of "host" city for displaced people running from neighbouring villages (Vwima, 2014).

Located in a zone with heavy mineral extraction, Bukavu is the exit point for minerals (both legal and illegal) produced in the province. While extractivism exacerbates conflicts in the region, it also affects agriculture and food security, creating a political economy based on mineral exports and food imports in the city.

Bukavu's staple foods are cassava, bananas, maize, beans and rice. These are also the most widely grown crops in South Kivu, with 55% of the crop sold in the city and nearby villages. These foods cost between USD 0.5 and 0.75 per kilogram, while the mean daily income is USD 1, leaving a large portion of the community unable to meet their daily caloric needs, even in terms of raw food. Also, the city's demand for these five crops is not met by this local production. Cassava flour is imported from Rwanda, primarily through Kamembe (65.2%), and from North Kivu province, through Goma (19.2%). Availability of beans, fish and meat also relies heavily on importation. Despite South Kivu also having a high climate potential for rice production, fish farming and livestock farming, these sectors are not developed because of, among other things, the growing insecurity due to the presence of armed groups and repeated ethnic and land conflicts.

In addition to conflict and mineral rush, the city's local food supply from rural areas faces several challenges: poor road conditions, high cost of fertilisers and other agricultural inputs, high transport costs, commercial, administrative and fiscal harassment, instability of supplies by the territories, and strong competition from

outside products (from North Kivu, Rwanda, Uganda, Burundi and so on). Hence, it requires a synergetic effort for the local food supply to be profitable, resilient and sustainable (Cokola et al., 2019).

Aside from territories in South Kivu failing to provide Bukavu with food, its dependence on North Kivu province has been challenged by the recent clashes between the Congolese Army Forces and the M23 rebels, leading to frequent shortages of beans, potatoes and onions in the city.[1] This situation worsened when the Congolese government decided to close its borders with Rwanda daily from 3 pm to 6 am (after a Congolese soldier attacked Rwandan border agents in reaction to the DRC's government's accusation of Rwanda supporting the M23 rebellion), hindering the movement of small food traders. In addition to these national and regional problems, the wars in Ukraine and Gaza have caused a general increase in commodities' prices and imported food items are no exception.

Study objectives and methods

In view of the above, we conducted an in-depth assessment of Bukavu's nutrition, to generate an evidence-based understanding of food availability, quality and access in formal and informal settlements. The study seeks to answer the following specific questions:

- What are the key actors in Bukavu's food systems and how do these actors and community members perceive food availability, food environment and food access?
- What influences food availability and food access in the context of ongoing conflicts, extractivism and population boom cities?
- What formal and informal efforts are working towards improving food availability and food access?

We used a mixed method approach to answer these questions. We combined a literature review, focus group discussions (FGDs) and key informant interviews (KIIs). The desktop literature review helped to map actors and summarise existing literature on food security and nutrition status, policies on health and nutrition, and determinants of health and nutrition status. Key informant interviews (27) were organised with nutrition and urban planning specialists, policymakers, local government agencies, private providers, academics, food retailers' associations and consumers, especially residents of informal settlements. Finally, focus groups (eight) were conducted with users and providers of services (both formal and informal), such as food vendors (licensed and unlicensed, cooked and uncooked, market stalls, small shops), food transporters, non-governmental food and nutrition service providers (contracted or not contracted, for profit and not-for-profit), childcare and schools (public and within low-income neighbourhoods, mainly private). The data generated from literature review,

[1] Focus group discussion with food traders at Nyawera Market, 2023.

focus group discussions and key informant interviews was categorised into various thematic areas and analysed through content analysis.

Structure of this paper

An executive summary gives an overview of the background, the main questions, the methodology and key findings. The first section presents the introduction, which describes the nexus of conflict, war and food security in the context of the population boom. It also presents the conceptual framework of this study. The second section focuses on nutritional and health outcomes, and key challenges that affect the food supply chains in Bukavu. It also describes the food environment and how price volatility, taxation, corruption and political drivers affect the availability, access and utilisation of food in Bukavu. It ends with a focus on the most vulnerable groups and what is unknown about nutrition, health and wellbeing within the community. The third section presents the actors, the collaboration among them and the governance of the food security sector in DRC. The fourth section presents the solutions proposed by stakeholders to enhance the availability, access and utilisation of food. The fifth section focuses on community perceptions through a discussion of the key findings from the FGDs and KIIs, while the sixth section presents the conclusion and policy recommendations.

Key findings

Emanating from the literature review, FGDs and KIIs, these key findings illustrate the vulnerabilities of food availability and food access:

- **Income**: The daily income of most households is not sufficient for their food needs. Indeed, staple food costs USD 0.5 to 0.75 per kilogram, while many people earn USD 1.
- **Inflation**: The instability of food prices and the declining value of the local currency (CDF) reduce household purchasing power and food availability in markets. Both wars (in North Kivu province, in Ukraine and in Gaza) and the Covid-19 pandemic led to high inflation.
- **Location**: Households in informal settlements have less access to food.
- **Poor infrastructure**: The poor roads between Bukavu and rural areas and other provinces negatively affect food availability and access. This leads to increased prices of agricultural inputs and food shortages in times of crisis. Limited access to the market also disincentivises farmers to produce food.
- **Ongoing conflicts**: The insecurity and the presence of armed groups in the most agricultural zones affect both production in rural areas and the availability of food in the city. Sometimes rebels kidnap food transporters on their way to the city.
- **Mineral rush**: Not only does extractivism reduce the agricultural workforce, but booming mine towns also compete with the city on food demand, since their demand quickly exceeds the production capacity of the neighbouring villages.
- **Seasonality**: Due to the poor road conditions, the rainy season (more than eight months) significantly reduces food availability in the city. In addition, local

agriculture is (and will increasingly be) affected by climate change, recent floods and crop diseases.

- **Food import**: Due to low production levels, most of the food consumed in Bukavu is imported from other countries or bought from North Kivu province. However, the current M23 war in North Kivu and international crises put food availability and access at high risk.
- **Lack of political will**: The low budget allocated to nutrition and health reflects the lack of political interest in this sector. The city does not have a specific plan for food security, despite the increase in population. However, food availability is used by most political elites to impact their legitimacy and increase their votes.
- **Existing efforts**: Despite the weakness of state authority in many other domains and the existence of corruption, some initiatives have been taken by the government and its partners to ensure food availability. Unfortunately, these efforts are too slow compared to the increase in food demand and the diminishing local food production.

1. Introduction

In many parts of the world, populations' access to food is thought to be restricted by mining interests (Wegenast and Beck, 2020). While mining can create income opportunities and improve market access for millions, particularly by serving as an escape route from "agricultural poverty" and contributing to rural livelihood diversification (Hilson et al., 2021; Maconachie and Binns, 2007), its expansion often comes at the expense of agriculture, more sustainable sources of food and jobs in the long term (Badeeb et al., 2017). This concern is particularly pressing in autocratic regimes, where the exploitation of extractive resources often leads to a lack of spillovers across sectors and low levels of investment in agriculture (Dorinet et al., 2021). Land degradation, water pollution from mining activities (Nkuba, 2021), and displacement of farmers (Mukotanyi, 2022) all threaten food security in these regions (Ofosu et al., 2020), potentially leading to food price inflation and hindering efforts to eradicate hunger. This can create a vicious cycle, as the loss of agricultural income traps people in the riskier and less sustainable artisanal and small-scale mining (ASM) sector (Veiga and Marshall, 2019). This cycle is further exacerbated by governments prioritising short-term gains through mining royalties over long-term investments in infrastructure and sustainable agriculture. This "resource curse" approach, reminiscent of colonial-era strategies (Radley and Geenen, 2021; Signé and Johnson, 2021), weakens communities and jeopardises food security.

Furthermore, protracted political crises, along with frequent low-intensity wars, disrupt food production and distribution networks in many African cities (Dodo, 2021). These conflicts – like the current famine in Nigeria's northeastern Borno state, where clashes with Boko Haram have disrupted livelihoods – displaced people and limited access to food (George et al., 2020). Bukavu is no stranger to such struggles. Repetitive wars since 1996, fuelled by power struggles, ethnic tensions and land conflicts, have displaced millions, destroyed livelihoods and worsened hunger, particularly among women and children (Udelsmann et al., 2021). This ongoing violence shapes Bukavu's complex urbanisation. Victims of several repeated wars experienced a population explosion, leading to an intense rural exodus, triggering a very rapid urbanisation manifest throughout the city (Casinga et al., 2017). The city's population tripled between 2000 and 2012, and the war even spurred the rise of temporary "boomtowns" around resource extraction sites (Büscherm, 2018). These boomtowns exhibit unique "urban" characteristics in terms of infrastructure, economy, services and culture, setting them apart from their surrounding rural areas.

However, this rapid urbanisation, a trend particularly strong in Africa and Asia, adds another layer of pressure on food security. While urban areas generally offer better food access than rural ones (Hirvonen et al., 2020), the poorest urban residents often face difficulties obtaining sufficient and nutritious food. Indeed, urbanisation, as Satterthwaite et al. (2010) pointed out, can threaten food security by draining rural areas of labour for cities and converting farmland to sprawl. This creates a double challenge for the city: a growing population needing food and many new residents in

informal settlements lacking access to basic services, decent jobs and affordable, healthy food. Healthy food is food that contains micronutrients, in appropriate proportions to support energetic and physiological needs without excess intake and to minimise harmful elements (Neufeld et al., 2021). Furthermore, the growing urban population strains local resources, and large swathes of agricultural land around the city have been acquired by politicians and elites, often for non-agricultural purposes (Mudinga and Wakenge, 2021; Shamamba et al., 2021). This land grabbing, with roots tracing back to colonial-era practices, reduces local food production (Bahati Shamamba et al., 2023). The remaining land is often leased to small-scale farmers with limited resources, who practise subsistence farming (Bashwira and Burny, 2010). This combination of factors makes it difficult to ensure food security for Bukavu's growing population.

Additionally, urbanisation affects how people eat in cities, increasing the demand for manufactured foods that need a lot of resources (Satterthwaite et al., 2010). Urbanisation is a trend that is especially prominent in developing nations and is influencing the way people consume food today. This change is most noticeable in Bukavu, where there is an increasing need for a variety of meal options and outside catering is becoming more common (Neema and Lebailly, 2020). For people on low incomes, street food is the most affordable and convenient way to get a balanced meal outside of the home. Studies show this applies to everyone in many African cities, from students to office workers, single people to families. It is portable, cheap and fits perfectly into busy lives (Ombeni et al., 2018). But widespread poverty, particularly in peri-urban areas (Muhaya et al., 2022), makes it harder to obtain production factors and increases reliance on imported, frequently highly processed, goods from nearby nations. This, as Wei (2020) points out, is a common challenge for sub-Saharan Africa, as the region's net agricultural import bill is dominated by four countries: Nigeria, Angola, the Democratic Republic of the Congo and Somalia. The "double burden of malnutrition and obesity" that has been seen in this region in recent decades is partly caused by this region's reliance on processed imports (Reardon et al., 2021). This results in persistently stunted and wasted youth, along with increased rates of overweight and obesity.

Bukavu's booming population strains local food production, forcing increased reliance on imported food. This shift, coupled with unhealthy childhood dietary habits, contributes to a rise in adult obesity, despite the prevalence of childhood malnutrition (Mwene-Batu et al., 2021). Like many developing cities, Bukavu faces a double burden of malnutrition: childhood deficiencies alongside a rise in adult obesity. This paradox stems from inadequate food diversification during weaning, leading to malnutrition in children, followed by unhealthy dietary habits later in life, influenced by cultural beliefs. As in many African societies, larger body size is often associated with beauty, wealth and even good health, promoting a preference for high-calorie foods rich in fat and sugar (Mahano et al., 2020). Current policies understandably prioritise hunger reduction, due to factors like inadequate child feeding practices, food insecurity, poverty and limited healthcare access (Agostoni et al., 2023). However, the

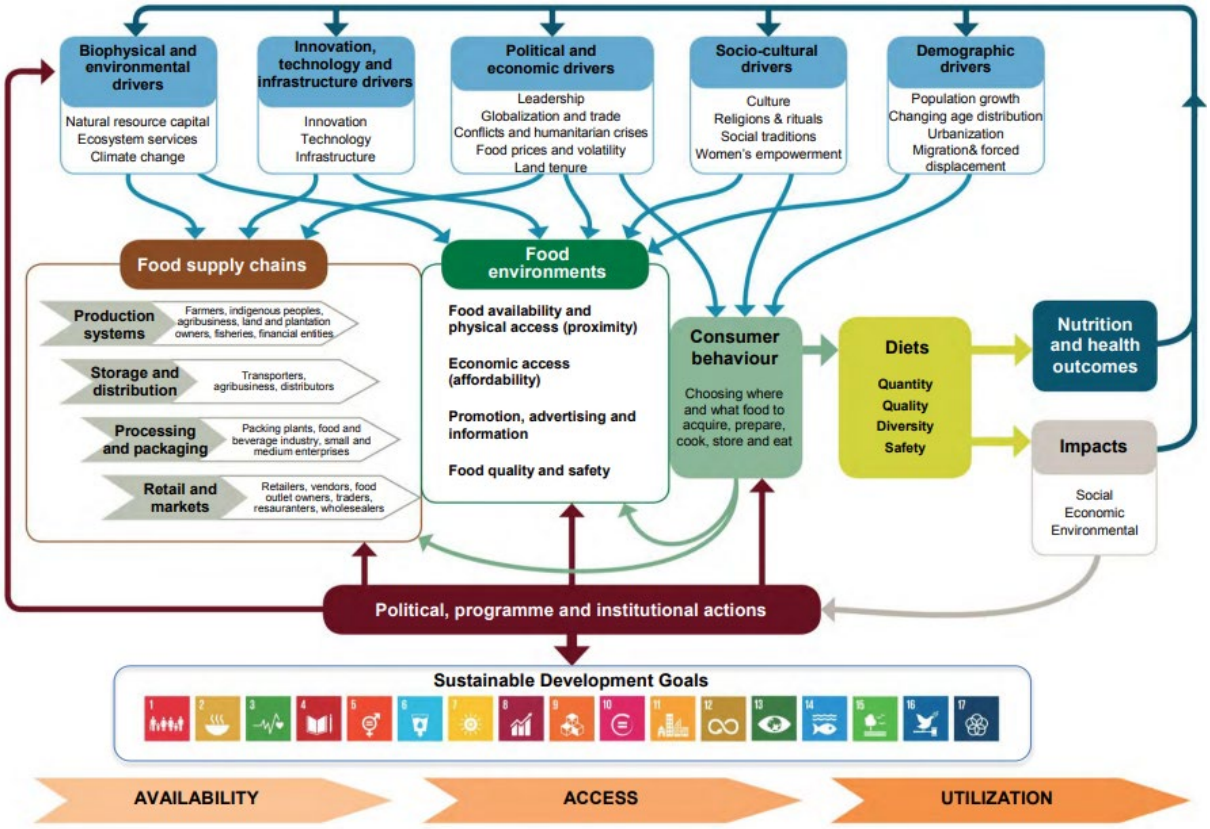
coexistence of overweight and obese individuals with undernourished children in the same households underscores the urgent need to address both food quantity and quality (Harper et al., 2022).

While some cities worldwide are taking action, most, including Bukavu, have not yet prioritised food security as a core element of urban resilience planning. The recent disruptions to global supply chains caused by Covid-19 and the Ukrainian war serve as a stark reminder of the need for stronger and more adaptable food systems (Pérez-Escamilla et al., 2020; Soria-Lopez et al., 2023). In view of the above, this study aims to provide a novel analytical framework for examining the vulnerabilities of food systems in cities experiencing prolonged conflict and extractivism.

This paper aims at understanding 1) the drivers of food security in fast-growing cities; 2) how protracted war and extractivism interact with these drivers, food availability and food access; and 3) how war and extractivism hinder the local solutions to securing a steady food supply. This study can help analyse food security in other cities that are found in conflict-endowed regions and for which extractivism has caused both poor governance and created or exacerbated existing conflicts.

We used qualitative methods, collecting information from literature review, focus group discussions and key informant interviews. The literature review helped to map actors and summarise existing literature on food security and nutrition status, food security policies and determinants of its status in Bukavu. Key informant interviews (27) were organised with nutrition and urban planning specialists, policymakers, local government agencies, private providers, academics, EPI programmes, food retailers' association, and consumers, especially residents of informal settlements. Finally, focus groups (eight) were conducted with users and providers of services (both formal and informal), such as food vendors (licensed and unlicensed, cooked and uncooked, market stalls, small shops), non-governmental food and nutrition service providers (contracted or not contracted, for profit and not-for-profit), childcare and schools (public and within low-income neighbourhoods, mainly private). The data generated from literature review, focus group discussions and key informant interviews was categorised into various thematic areas and analysed through content analysis. We built our analyses on the FAO framework on food systems (Figure 1) (HLPE, 2017), which defines food security through four pillars: availability, access, utilisation and stability. The most recent definition (HLPE, 2020) introduces two additional pillars: agency and sustainability. Our paper brings together all physical and social drivers acting directly and indirectly on food security as well as the supply chain, consumers' behaviour and the general outcome of all these factors' interactions (HLPE, 2017).

Figure 1: FAO conceptual framework for food systems



Source: HLPE (2017).

2. Health, wellbeing and nutrition in Bukavu

2.1. Urban nutritional and health outcomes

2.1.1. Nutritional indicators

Bukavu's population faces many health issues, including undernourishment of children (under five years of age) and pregnant and breastfeeding women. A recent survey showed a prevalence of severe malnutrition of 2.4% (considering weight/height ratio) or 5.3% (brachial perimeter); 0.1% of malnutrition oedema; a prevalence of stunted growth of 42.2%; and a prevalence of underweight of 13.4% among children between six and 59 months old (PRONANUT, 2023). The same survey showed a mean of 6.5% of pregnant and breastfeeding women with malnutrition. The undernourishment rate differs from municipality to municipality. Table 1 and Table 2 show different indicators of undernourishment of children from six to 59 months and women, respectively, in the city's three municipalities.

Table 1: Nutritional status of children from six to 59 months in Bukavu

Nutritional status of children aged six to 59 months	Ibanda	Bagira	Kadutu
Global acute malnutrition	2.8%	1.7%	2.3%
Severe acute malnutrition	0.8%	0.2%	0.5%
Chronic global malnutrition	44.6%	51.1%	44.8%
Severe chronic malnutrition	22.2%	24.5%	19.4%
Global weight failure	11.4%	13.3%	10.6%
Severe underweight	2.0%	2.4%	1.4%
Acute global malnutrition	12.3%	4.1%	4.0%
Severe acute malnutrition	5.0%	0.6%	1.2%

Source: SMART anthropometric nutrition and mortality survey in Bukavu (PRONANUT, 2023).

Table 2: Nutritional status of women of childbearing age

Acute malnutrition (undernutrition)	Ibanda	Bagira	Kadutu
Women of childbearing age	10.3%	10.3%	5.9%
Pregnant women	8.2%	7.1%	4.2%
Breastfeeding women	11.2%	5.6%	4.2%

Source: SMART anthropometric nutrition and mortality survey in Bukavu (PRONANUT, 2023).

2.1.2. Food-related diseases

Despite Ibanda being the richest municipality in Bukavu, undernourishment seems to be high. This situation can be explained by the increasing number of informal settlements (Gyamba, Luziba, Ruzizi and so on) in this municipality and the unfavourable economic situation of the inhabitants of Panzi neighbourhood, which is home to more than half the population of this entire municipality. Mwene-Batu et al. (2021) revealed a low prevalence of a minimum acceptable diet among infants between six and 23 months of age. Interventions that provide education to mothers can significantly improve complementary feeding knowledge and practices. This undernourishment induces stunting, lowers immune defences and reduces cognitive and learning capacities (Mwene-Batu et al., 2021).

Apart from this undernourishment, there is an overnourishment that coexists with the presence of non-communicable diseases (NCDs) in the city, such as high blood pressure, cardiovascular disease, diabetes and obesity. Katchunga et al. (2016) show that the prevalence of diabetes is 5% in the city. The coexistence of malnutrition and

diabetes represents a public health issue and limits the management of both diseases. Other diseases related to nutrition include high blood pressure, elevated LDL-C (low-density lipoprotein cholesterol), hyper-TG (hypertriglyceridemia) and overweight (Mwene-Batu et al., 2022).

Bukavu records a mortality rate of 0.24/day/10,000 inhabitants of children from six to 59 months old and 0.73 of the population. This mortality is due to a number of factors, including malnutrition, a lack of healthcare access, a lack of water access and low food access. Moreover, according to the report on the SMART anthropometric nutrition and mortality survey, there are 15 recognised nutritionists for more than 1.2 million people (respectively five, eight and two nutritionists in Ibanda, Bagira and Kadutu health zones for a population of 496,000, 152,000 and 404,000 inhabitants, respectively). The city does not have enough nutrition centres, and the few that exist only deal with undernutrition (but not overweight).

The Ibanda health zone has a steady socioeconomic situation, compared to the two other health zones. In Kadutu health zone, most people work in small trades, as poorly paid government employees and, in some cases, in subsistence agriculture. The destruction of economic and social infrastructure, as well as the social disruption of government public services, have all contributed to an increase in the unemployment rate in this area (with most people leaving when they become better off). Access to social services has decreased as the population has become more impoverished. This health zone's socioeconomic standing is worse than Ibanda's, although it is still regarded as “acceptable” overall when compared to Bagira (Makali et al., 2021). The Bagira health zone has lower access to healthcare and other basic services, higher rates of poverty and unemployment, infrastructure in a dismal state, and higher rates of chronic diseases (Malembaka, 2021).

2.1.3. Focus on curative measures rather than prevention

The weaknesses of the health system highlighted in the National Health Development Plan show that this system does not focus on disease prevention. For example, in 2019, preventive care represented 18.3% of the budget, compared to 59.7% for curative care. The Congolese government does not allocate a significant budget for preventive care. The focus seems to be more on treating malnutrition (through community management of acute malnutrition [CMAM]) than promoting preventative measures through education or food security initiatives. Whether it is the government or partners, their tendency is to focus on curative measures. This would be explained by the seriousness of nutrition, health and food security issues in South Kivu Province. Indeed, this province is classified as an emergency zone (OCHA, 2023); this would first involve emergency responses to save lives. The city hall’s health, hygiene and sanitation unit does not yet have a programme/plan to improve food availability. The city hall relies on the actions of its partners to fight malnutrition, but this is not enough. Some city hall officials believe that food security is addressed in the urban reference plan, which was developed with the support of the World Bank. However, the

implementation deadline for this plan has passed, and it is still not accessible to city hall agents.[2]

2.2. Main challenges to Bukavu's food supply chains

This section explores how the mineral rush, ongoing conflicts, poor road conditions, the land capture phenomenon and low soil fertility affect the food supply chains in Bukavu and, consequently, food security. It ends with a proposed conceptual "model" based on food import and mineral export to illustrate and reinforce the role of extractivism in urban food security.

2.2.1. Mineral rush, conflicts and bad roads

Since the Mobutu dictatorship fell in the 1990s, a large portion of the Eastern Democratic Republic of the Congo has been involved in three decades of localised and regional wars and bloodshed. Through a complicated web of local armed organisations structured around historical grievances pertaining to ethnicity, land rights, regional politics and other concerns, the war has been continuously fuelled (Boeyink et al., 2022). The war from 1998 to 2003 offers a starting point for understanding the profound transformations and continuities related to the country's extraction and trade of minerals (Geenen and Cuvelier, 2019). During this war, Uganda and Rwanda looted the Congo's natural resources (Marysse and Tshimanga, 2013; Vlassenroot et al., 2012) and gained control of its mining sites and trade routes. These conflicts have repeatedly devastated agricultural production, displacing farmers and disrupting food security in the region (Kabunga et al., 2023). The resulting migration to cities in North and to South Kivu further strains food supplies by turning previously food net producers into net consumers. Indeed, as these urban newcomers can no longer grow their food, they rely on often unreliable aid and imported food, creating a vicious circle of food insecurity (Veress, 2024).

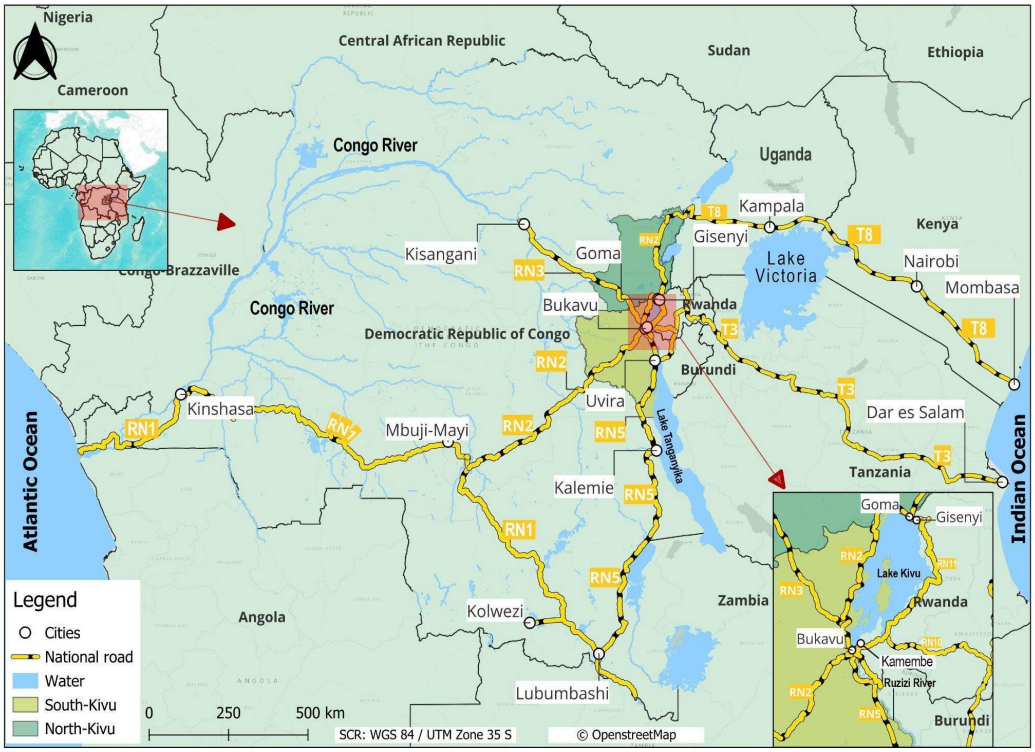
Furthermore, the poor state of national roads makes the transportation of food from the production zone to the city more problematic, with the resulting high transport cost impacting food prices (Cokola et al., 2019). To understand this, we take a look at Bukavu's main supply routes (Figure 2). Bukavu is connected to the rest of the DRC through three national roads. First, national Road 2 (RN2) goes from Beni, in North-Kivu province, to Mbuji-Mayi, in Kasai Oriental, where it connects to RN1, which goes from the Atlantic Ocean on the extreme west of the country to the country's southwestern border (with Zambia). Secondly, RN3 connects Bukavu to Kisangani, another major DRC city connected by boats on the Congo River to the capital, Kinshasa, where RN1 passes. Finally, RN5 connects Bukavu again to Lubumbashi, where once again RN1 passes. However, these roads are in such bad shape that not only are trucks unable to transport unprocessed foods within their short lifespan, but even non-perishable products end up not being worth transporting on these roads. One of the rare portions of national road in good shape in the DRC is a 400km strip on RN1

[2] Focus group with business operators in the commune of Ibanda.

from Kolwezi, the global capital of cobalt, to the Zambian border, where it is exported towards China, with no value addition in the country. Local and agricultural feeder roads are in even poorer shape, failing to support the supply of foods produced in South Kivu or encourage farmers to meet the city's demand. Bukavu, thus, has to rely mostly on its connection to the Indian Ocean through Rwanda and Tanzania, despite political tensions with Rwanda, or Lake Kivu connecting it to North Kivu, as well as another route to the Indian Ocean through Uganda and Kenya. The National Fund for Road Maintenance (FONER) focuses its work on the collection of road levies on unmaintained roads in very poor shape. Local volunteers step in to fix bridges and potholes, but most road users resist contributing financially to their ineffective attempts (Muzalia et al., 2021).

Failure to connect production hubs in isolated and rural regions to consumption centres in metropolitan areas increases poverty and conflicts in the former (Neema et al., 2022). Indeed, the Ruzizi valley, despite its fertile land and low population density, fails to meet its potential to feed Bukavu (Mondo et al., 2020). This is partly because the national road (RN5) that passes through it and connects Bukavu to Lake Tanganyika and Tanganyika province is in bad condition, rendering food transport difficult. Food must thus be transported via roads in Rwanda to reach Bukavu. Unfortunately, Rwanda restricts the passage of certain food items, such as dairy and fish, further discouraging production and fostering poverty and conflicts. Upgrading NR5 may not only ease food transport from the valley but also bypass Rwanda's restrictions, allowing for a wider variety of food products to reach Bukavu and contributing to the city's food security.

Figure 2: Bukavu main supply roads



Source: OpenstreetMap

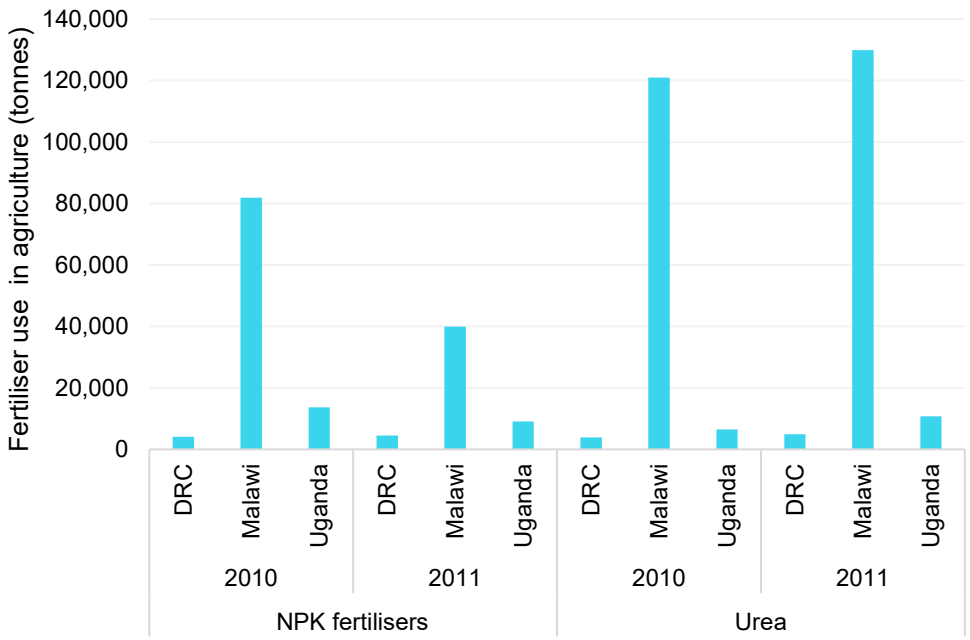
2.2.2. Land capture, low fertility and lack of fertilisers

For decades, unstable and unfair land distribution has severely limited agricultural production around Bukavu. People have faced long-term hardship, due to the loss of property, forced displacement and the abandonment of their primary livelihood: agriculture. This has significantly disrupted the economic and social order. In the wake of repeated violence (including two wars between 1996 and 2003) and persistent instability, artisanal mining became the main way for locals to survive (Bashwira and van der Haar, 2020). This situation has historical roots. During colonial times, villagers were forced from their land to work in mines (Vlassenroot et al., 2012). After independence, this pattern continued as President Mobutu seized the land again, granting it to political elites instead of returning it to the villagers (Rapanyane, 2022). This dispossession continues today, with powerful figures reacquiring the land and forcing villagers into precarious rental agreements, with the threat of eviction (Shamamba, 2021). These practices mirror the colonial era, stripping villagers of control over their land and discouraging investment in long-term agriculture (Büscher et al., 2014).

Despite South Kivu province's agricultural potential, local food production remains low. This results from soil infertility, limited access to agricultural inputs (such as fertilisers, pesticides and improved seeds), challenges with agricultural feeder roads (as discussed in the relevant section) and weaknesses in public agricultural research centres and extension systems. Additionally, resistance to adopting new agricultural technologies contributes to this situation (Badibanga and Ulimwengu, 2020; Murhi et al., 2018; Zenda Za Begani et al., 2024). This situation is forcing farmers to continuously produce crops on their small plots without any break or replacing the harvested nutrients with fertilisers (Kayani et al., 2021).

Thus, rural areas also import food, and a significant quantity of food imported into Bukavu is transported to rural zones. Between 2013 and 2018, cereal production in South Kivu province fell by 15% (from 2.8 to 2.4 metric tonnes) and by 40% for cassava production. Munyahali et al. (2023) found that the high price of mineral fertiliser is a major barrier to adoption for many farmers and reduces cassava yields. Indeed, urea and KCl prices are three to ten times higher than elsewhere in the world. For example, urea costs USD 1.30/kg in the DRC but only USD 0.882/kg in neighbouring Rwanda. Similarly, KCl costs USD 1.40/kg in the DRC but only USD 0.788/kg in Rwanda (Kayumba et al., 2023). Available data (FAOSTAT) show a low use of fertilisers in DRC compared to other sub-Saharan countries (Figure 3).

Figure 3: Use of fertilisers in agriculture (tonnes)



Source: FAOSTAT (2024)

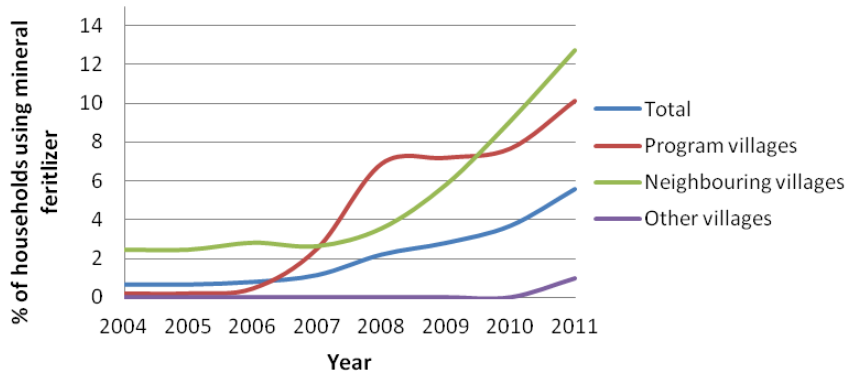
Even though available data on the use of fertilisers is from 2011, the situation has not changed yet; agriculture in DRC has a low use of fertilisers.

Additional pressure comes from the fast-increasing rural density near the city, far higher than the area's ability to produce food. This is explained both by high birth rates and by migrations from unsafe areas. For the reasons outlined above, it is clear that rural areas around the city are also importing food. Furthermore, in addition to a direct effect on agricultural production and food availability, population displacement has an indirect effect. Indeed, displaced populations who do not reach the city stay concentrated in some towns around Bukavu (commercial centres), such as Kavumu, Nyantende, Nyagezi, Mugogo and so on, where the high population density reduces their ability to produce food. As a result, these towns (located on the path between the city and agricultural zones) intercept a significant quantity of food that does not reach the city.

Despite the efforts of some NGOs, universities and research centres to address problems of soil fertility and agricultural production through experiments and sensitisation, the government does not invest in order to make experimental results widely available and useable for farmers. One example of an extension programme is the Integrated Soil Fertility Management (ISFM) programme in South Kivu, led by Consortium for Improving Agriculture-based Livelihoods in Central Africa (CIALCA) agricultural technology in 2006 (Figure 4). This programme used a variety of approaches to reach farmers, including radio programmes, agricultural inputs' kiosks, farmer association meetings, demonstration trials and on-farm trials. On a small scale (villages in experimentation), this programme increased the percentage of households

that used mineral fertilisers during the programme period, although the sustainability of this adoption should be assessed. Indeed, a post-ISFM empirical analysis found high awareness of the new fertiliser programme among poor farmers but low adoption, due to cost and knowledge barriers, while this programme had facilitated the reduction of fertiliser prices with the link between agro-dealers and the programme associations.

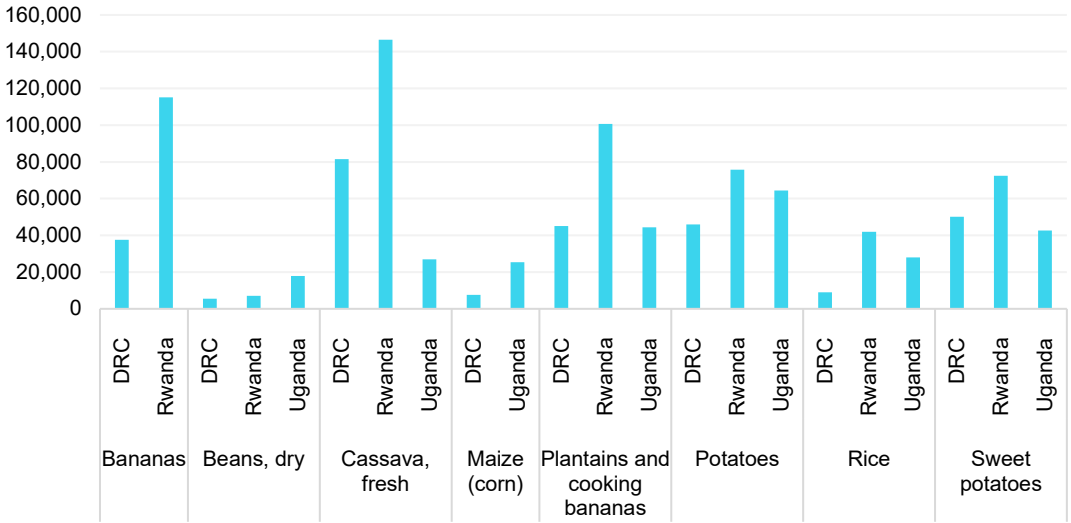
Figure 4: Rate of households applying mineral fertiliser, 2004-2011



Source: Lambrecht et al. (2014)

The low soil fertility and the limited access to inputs make South Kivu agricultural production low compared to neighbouring Great Lakes countries, as shown in Figure 5. Figure 5 shows the mean production per hectare of some staple foods in the DRC, Rwanda and Uganda in 2022.

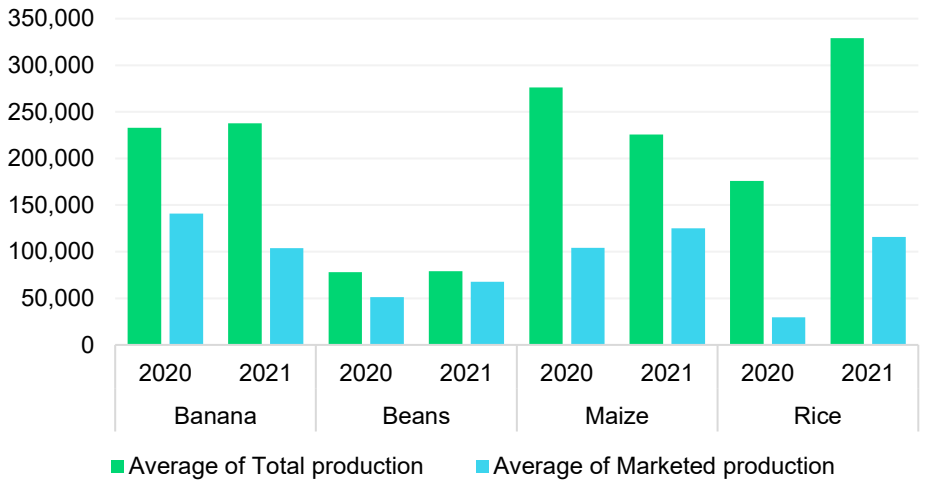
Figure 5: Crop production (100 g/ha) in the DRC, Rwanda and Uganda, 2022



Source: FAOSTAT (2024).

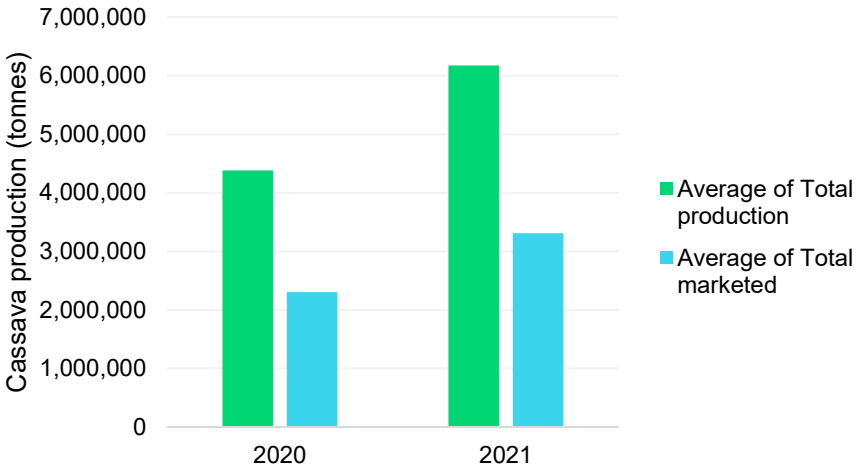
Furthermore, the low livestock production does not meet animal protein needs. However, the sources of animal protein found in this city are beef, pork, goat, rabbit, poultry, dairy products, fish and insect larvae. Therefore, access to animal protein per capita is low, as it is in almost all sub-Saharan countries (43kg meat/capita/year and 20.2kg fish/capita in 2020). Regardless of household income, animal protein costs a lot and makes up 28.3% of the city's household spending (13.1% for fish and 15.2% for meat) (Vwima, 2014). Urban and peri-urban agriculture are almost non-existent, due to high population growth and poor urban planning (spread of informal settlements). Despite these agricultural production challenges, however, South Kivu still produces small quantities of cassava flour, corn, rice, and so on (Figure 6 and Figure 7).

Figure 6: Total production and the quantity marketed of four staple foods and the marketed quantity (tonnes)



Source: Agriculture Inspectorate reports (IPA SUD-KIVU, 2022, 2021).

Figure 7: Total production of cassava and quantity marketed (tonnes)



Source: Agriculture Inspectorate reports (IPA SUD-KIVU, 2022, 2021).

2.2.3. The "export minerals and import food" model

Bukavu is at the crossroads of an economic model based on the illegal and legal exportation of minerals and the importation of food. Indeed, Bukavu is a great exit route and a collection point for both legal and illegal minerals (gold, tin, tungsten and tantalum; or 3TG) from South Kivu. Most of the minerals are exported for processing, depriving the local community and economies of jobs or income opportunities that would improve their ability to access food (UNECA, 2011). While the mining sector has been reducing the agricultural workforce (Mukotanyi, 2022), the minerals it produces help the city import its food. The main food imports are rice, maize, wheat, beans, meat and fish, which are imported mainly from neighbouring Rwanda. The significant flow of food supplies from Rwanda makes it a major food source for thousands of families, with women playing a key role in the cross-border trade. However, this reliance on food imports has led to foreign food dominating local markets, to the detriment of local products, as imported goods are often cheaper and more readily available. Consequently, traders and household managers turn to imported goods to compensate for the virtual scarcity of local products (Cishunguluka et al., 2022).

A study on food imports and their effect on food security found that 56% of the population opts to consume imported foods because of their availability, 26% because of their cheaper price and 15% because of their quality. Despite this, most people believe that importing food decreases access to healthy diets, which are better guaranteed through local production (Cishunguluka et al., 2022). During Covid-19, the high cost of beans (varying from USD 1.5 to almost USD 4.4) made them a small luxury, out of reach for many households. This was critical, since beans are a key component of the local diet, compensating for animal protein deficiencies. Indeed, beans are the third most consumed food in the city (after cassava and maize, which are mostly carbohydrates). According to Vwima (2014), the consumption of beans in Bukavu is 49g/capita/day, which accounts for 167kcal/capita/day. Its micronutrients account for up to 80% of daily iron intake (Birachi et al., 2021). This is likely to worsen food security in the city. A bacterial disease known as banana bacterial wilt attacked the banana plant during this decade in South Kivu, greatly reducing banana production. Research centres and some NGOs have made efforts to fight this plant disease. Nowadays, a significant number of bananas consumed in Bukavu come from Kalehe territory.

2.3. Food environment

2.3.1. Food retail environment

Bukavu's food market includes both formal and informal sectors. The formal market is composed of large grocery shops, public markets and small private shops, while the informal market consists of a street food market and a door-to-door market. While hygiene and food safety depend on the type of market, access to each one varies not only with road infrastructure (proximity) but also with socioeconomic factors affecting consumers.

- **Large grocery shops**: Only a minority of the population with high household income accesses large grocery shops. Food hygiene practices are at least observed, since their customers are more demanding. Most of the food sold in this type of market is imported, and the price is higher than in other types of markets. Large grocery shops are present only in Ibanda municipality (especially in two neighbourhoods).
- **Public markets:** In practice, regulated markets in Bukavu are frequently characterised by a physical structure, tax collection, and management. Each commune has an office that organises and manages the markets, engaging in such activities as tax collection, the designation of marketplaces and the market committee. Bagira commune has one regulated market (Bagira Market), Kadutu commune has two (Beach Muhanzi Market and Kadutu Market), and Ibanda commune has four (Nguba Market, Nyawera Market, Feu Rouge Market and Kamagema Market) (Binda and Koch, 2021). Although local food is sold in these markets, a larger portion is imported food. In most cases, consumers' safety is not guaranteed, due to poor hygiene, inadequate food displays (on the ground sometimes), and work conditions that increase exposure to various contaminants. Also, because of overcrowding and poor hygienic conditions in markets, some consumers prefer buying food along the roads, where food is displayed in cleaner conditions, despite cars and pedestrians circulating next to it. Traders thus also prefer selling in the evening and even all day long on the street (despite the police brutality in evacuating them): "We prefer not to sell at the market because customers dislike seeing all this filth. So, despite the police brutality, we must go sell outside."[3] One of the solutions taken by urban authorities to fight informal markets was the establishment of a market ("Bondeko") but the lack of security (urban banditism) and electricity deter customers and traders from staying in this market, especially in the evening.[4] Some traders even bribe police officers to sell their goods outside. Also, this market cannot accommodate the (unknown) number of informal vendors.
- **Informal food markets**: As mentioned above, these are set up in public spaces (roundabouts), and along the roads, and traders spread out food on the ground. They are more attractive to people from low-income households, as they can find some products at a cheaper price, although their quality is also problematic. This market is operated by (though not limited to) door-to-door traders of fresh or cooked food (for example, pork meat, vegetables). Although the urban authorities prohibit informal markets, taxes are still collected from vendors in these markets, with traders typically paying a small fee per day. According to city officials, these taxes support public sanitation, security and infrastructure maintenance. However, informal vendors argue that taxing people who are already struggling to make ends meet is unfair. Many street vendors are women (82.8%), who use this form of trade to cover the basic needs of their families (Murhula et al., 2020). They come from both rural (40%) and disadvantaged urban areas (60%) and spend nine to 12 hours per day searching and selling a range of products, including vegetables and fruit. They earn USD 0.7-3.7 per day. Over 53% of those vendors earn less than the USD 1.90, set as a global poverty threshold by the World Bank (and adjusted to USD 2.15 in 2022).[5]

[3] Interview with an informal vendor of fish along the road.
[4] Focus group discussion with City Hall agents and street vendors in Nyawera Market.
[5] See 2022 World Bank Fact Sheet: An Adjustment to Global Poverty Lines (accessed 4 March 2025).

Despite the struggle to get goods (46%), the local currency depreciation and police harassment (sometimes leading to the loss of their products), street vendors play an important role in urban food security by making food readily available for the masses (Balasha et al., 2020).

- **Restaurants**: Several restaurants offer a variety of cuisines: local, foreign and fast foods. There are two main types of restaurants: “malewa” and formal restaurants. In formal restaurants, the quality of food is typically higher, as it is prepared by trained chefs and served in a clean and hygienic environment. Several “malewa” restaurants visited as part of this study invested more in making sure the food they offer is of sufficient quantity and at the lowest possible price. Food is frequently prepared outside, exposed to the elements and passers-by. Such restaurants are frequently found in markets, road intersections or other places with a high density of businesses. They are optimised for their target demographic, which is mostly low-income people, since those with high incomes can afford to pay extra for food that is more likely to be safe and can be eaten in quieter, more comfortable settings.

2.3.2. Sociocultural drivers of food access and food availability

Agricultural production in South Kivu province, specifically the choice of varieties, is impacted by culture. Although cassava is known to lack sufficient nutrients, as a cultural inheritance, it is the most commonly produced and consumed crop. This high attachment to certain crops or varieties leads to low productivity. In addition, culture also influences the consumption habits. Although Bukavu is cosmopolitan, diet diversification is not significant, with most tribes tending to converge towards the most easily available foods. For example, although insects are consumed by Lega (an ethnic group from Mwenga and Shabunda territories), due to limited access, they tend to follow the same diet as Shi and Havu (two ethnic groups whose territories are closer to Bukavu, and thus are in larger numbers in the city). There were also some dietary prohibitions (for example, a woman should not eat chicken in Shi and Havu culture) that would have negative effects on production, although this tends not to be observed in urban areas.

Other drivers can shape access, including the household head’s type and schedule of work (which defines the time of cooking), the distance between the house and the market, the seasonality of production, and so on. For example, some households grow some of their food in their backyard in the city or own a larger farm in a village, from which the harvest is sent to them. The most common crops grown on these micro-farms include maize, cassava, beans and vegetables. Small gardens producing vegetables for daily consumption are often found in informal settlements, allowing people to eat vegetables almost every day. An informal settlement resident said, “We have a small garden behind the house, where we grow vegetables and store household waste”.

In addition, many people do not understand the importance of a healthy diet, and they may not have the means to eat healthily. Indeed, according to the United Nations Food

Systems Summit,[6] a healthy diet both promotes health and prevents disease; it provides adequacy, without excess, of nutrient and health-promoting substances from nutritious foods and avoids the consumption of health-harming substances (Neufeld et al., 2021). People believe that it is too expensive to eat healthily and that healthy food is difficult to find. They also believe that eating food from other countries is unhealthy because it may contain genetically modified organisms (GMOs). There is a lack of public confidence in the border control services, which could be influenced by business operators. There has not been a public awareness campaign about healthy eating, and many people are unaware of what constitutes a healthy diet.[7]

Another aspect is the lack of knowledge among most respondents of the link between diet-related communicable and non-communicable diseases (NCDs) within the city. Unhealthy diets, which are often high in processed foods and low in nutrients, are driving the increase of NCDs, such as diabetes and cardiovascular disease. This is especially true for poorer populations, who are more likely to eat unhealthy diets due to a lack of access to affordable, healthy food. People who eat a healthy diet are less likely to develop these diseases and are more likely to recover if they do develop them. However, most respondents do not understand the link between diet and disease, and this is a major obstacle to improving public health. Some respondents believe that they are unable to prepare food properly, due to their living circumstances. They cite a lack of access to clean water, cooking fuel and cooking utensils as obstacles to preparing healthy meals. Additionally, some respondents believe that thin people eat poorly and that children who eat poorly show it by having swollen bellies and skin that has lost its pigmentation (jaundice). One woman who lived in an informal settlement (at Kadutu) said that she lost her child because he did not like the food that she fed his older brothers. She stated that her children do not have access to vegetables, due to poverty, and they are fed only with a type of fish known to be low in nutrients – known as "*kabuchungu*" (meaning "the bitter one"). She recognised that kwashiorkor was the cause of her son's death.[8]

2.3.3. Regulation and food distribution

Regulation of the food trade in Bukavu is a complex and challenging issue. There are a number of factors that need to be considered, such as protection of public health, promotion of economic growth and the need to ensure fair competition. One of the key challenges is the lack of clear and consistent enforcement throughout the food supply chain. Despite the existence of some governmental institutions in charge of food hygiene and safety, food quality control and so on, implementation of regulations is not effective. Another challenge is a lack of transparency and accountability in the food trade.

[6] See UN Food Systems Summit 2021 website (accessed 3 March 2025).
[7] Focus group with consumers in an informal settlement in the commune of Ibanda.
[8] Interview with a woman living in an informal settlement in the commune of Kadutu.

This makes it difficult to identify and address problems such as food safety risks and unfair trade practices. For example, informal traders, particularly low-income women who trade in food, are neither organised nor represented. As a result, they are in a precarious position vis-a-vis the powerful officials who control the borders. At every border crossing, many officials seem to have ingrained negative perceptions of these women traders. Rude and hostile behaviour towards women traders is justified, and extortion is practised because they have no official status (Breton et al., 2011).

Many actors are involved in food distribution in the city. With regard to imported food, food importers store food (beans, maize flour, cassava flour and so on) in warehouses and sell them to both retailers and wholesalers. Private companies (DATCO and KOTECHA) distribute sugar, rice, vegetable oil and other imported products from Pakistan, Tanzania or India; they sell especially to wholesalers. While DATCO is more concerned with selling a range of products, including rice, flour and sugar, KOTECHA imports staples like these as well as vegetable oil and rice.

Additionally, uncovered ready-to-eat food is sold in many markets and hotspots throughout the city. Foodstuffs such as "*ugali*" (cassava, maize, and/or sorghum bread), rice, beans, cassava leaves, meat, fish and other prepared vegetables are commonly sold uncovered along the roads, with no way to escape the dust. Additionally, doughnuts, wafers and other products are sold uncovered, which vendors justify on the basis of their desire to attract customers. Some vendors interviewed said that they sell uncovered food because they do not have restaurants to display their wares. However, many observers are questioning the role played by the authorities responsible for hygiene and public health in protecting the health of local residents from the many consequences of this situation.

Fish is sold to retailers by traders who store fish imported from China and Uganda in refrigerated trucks. Fish retailers use ice to conserve fish; unfortunately, these ice cubes are unable to maintain a steady cold temperature throughout the day, which degrades the quality of fish and exposes consumers to certain foodborne diseases. Some fish species are caught locally in Lake Kivu: Nile tilapia, African catfish, Lake Tanganyika sardine (*Limnothrissa miodon*), and African cichlid fish (*Haplochromis* sp). Lake Kivu fishermen are mostly grouped in cooperatives, where everyone is obliged to save at least USD 1, or CDF 2,000 a day. This enables them to make some savings, which they deposit at the end of the month in a more viable financial institution (Ndabarushimana and Mwenyemali, 2021) to sell fresh and whole fish to retailers (mostly women). Retailers sell fish in two ways (often without using conservation techniques): in public markets; and door-to-door or on city streets. The price of local fish is a little higher than imported fish; the price of 1kg of fish ranges between USD 4 and USD 5 (for tilapia) and USD 3 for Lake Tanganyika sardine.

Dairy products, both local and imported from Rwanda, are distributed along the roadside by women. Local milk is often turned into soft cheese (locally called "*mashanza*") to conserve it. Dairy products are also available in some grocery shops and cafes. Meat is distributed through public slaughterhouses (ELAKAT, Muhanzi),

which supply meat to some delicatessens, retailers and butchers. Butchers sell it in public markets or on the roadside. Fruit and vegetables are distributed through public markets (Feu Rouge, Nyawera, Kadutu, Muhanzi, Bagira, Nguba and so on), as well as door-to-door sales by rural women farmers.

Restaurants are also implicated in Bukavu's food distribution. People take lunch (near their workplaces) in restaurants or purchase food to take home as dinner. There are two types of restaurants:

1. The "*malewa*", the most popular restaurants (71% of the market), do not guarantee security to consumers, due to a lack of hygiene and safety standards. In the most cases, the food is not healthier.
2. The "modern" restaurant (29% of the market), which is often out of reach for many residents.

Using imported food, these two types of restaurants also use local agricultural food (Neema and Lebailly, 2020) in order to support farmers and offer an affordable price. However, *malewa* prioritise local ingredients (over 58% of their budget) like potatoes, vegetables, beef and various flours. This suggests a menu focused on hearty, starchy dishes, with the mention of "fries" hinting at potentially fried options. Modern restaurants, while still buying local produce (nearly 38% of their budget), allocate more resources (31%) towards imported goods like rice and possibly tilapia. Additionally, their focus on local vegetables like cassava leaves ("*sombe*") and amaranths suggests they might offer a wider variety, with healthier, leafy green options.

2.3.4. Economic access to food (affordability)

Household income is the main factor that determines food choice and access. Food is more readily available when the general economy is doing well, as people have more money to purchase food. However, during times of political instability or conflict, food becomes scarce, as farmers are unable to plant and/or harvest their crops.

Food access depends not only on household income but also on other factors, such as the physical environment. Regarding the physical environment, availability of food varies, depending on seasons. Although we would expect a certain enhancement of food access and food availability during the harvest period, the harvest of several food products corresponds to the rainy season, in which roads become impassable

Whether food is imported or not, access to it varies according to household income. For example, households with a high income purchase products (beans, maize flour, rice and so on) in prepackaged 25kg and 50kg bags and save time to purchase them on a regular basis. Meanwhile, families on lower incomes buy a kilogramme or two daily at higher retail prices in public markets or informal markets, but more often on street corners or in a small shop in their neighbourhoods, from which they may be allowed to pay later in case of emergency. Though the latter is more expensive and time-consuming, it is unfortunately the only option most families can afford. Indeed, food access defines both food quality and public health in the city (see Section 2.4), as illustrated by the case of fish, meat and other perishable products.

2.3.5. Food safety, nutritional quality, WASH and communicable disease

Food hygiene is often poor in the city, due to a lack of access to electricity (which causes a breakdown of the cold chain) and a lack of food quality control (Appiah et al., 2020; Babe et al., 2018). The OCC (Office Congolais de Contrôle), a public service, oversees the safety of food and other products. However, owing to a lack of suitable quality control equipment and materials, a lack of capacity building for officers, corruption, and the high cost of quality control, its control is not effective. Some studies (Ngaruka et al., 2021) have even shown that a certain amount of meat sold in the city (imported and locally produced) contained antibiotic doses that could create resistance among consumers.

Street food is not supported by public service, despite being the source of food for many citizens. It is often contaminated, due to poor hygiene practices by vendors, leading to foodborne illnesses such as diarrhoea, skin infections and typhoid fever (Ombeni et al., 2018). Perishable foods are sold in the open air and are not properly preserved, which increases the risk of contamination. There is also no evidence that local and imported fish or meat processing does not contaminate the food with harmful substances, such as polycyclic aromatic hydrocarbons (PAHs). Moving forward, a more inclusive approach to food security should acknowledge the essential role of street food vendors. Instead of outright bans or impractical restrictions, the city can work with vendors to improve hygiene standards and avoid contamination (Ombeni et al., 2018).

Waste management is a major problem in the city and contributes to poor food hygiene. Many diseases, such as malaria, typhoid fever and cholera, are caused by unsanitary conditions (Ntwali et al., 2022). Indeed, the city has experienced demographic growth in recent years, due to a rural exodus (Displacement Tracking Matrix-DRC, 2024). Housing for the extra people not being made available through state channels, more informal settlements were created (Marhegane et al., 2022). The lack of planning, combined with the city's poor waste collection system (even in formal neighbourhoods), has led to a growing insalubrity, with proliferation of rubbish and other household waste. Today, large amounts of biodegradable organic waste, loose paper, plastic bottles, bags, sewage, and so on can be found all over the city. Indeed, from the more than 600 tonnes of waste that Bukavu produces per day (an average of 2kg per household), only 12.5% reaches landfill sites (BEGE-RDC, 2020).

To remedy this problem, the city council has set up a project called "*Bukavu ville propre*" ("Bukavu, clean city"), which consists of setting up community work known as "*salongo"* every Saturday throughout the city. The city council is also being assisted in this task by the DRC Social Fund (*Fonds social de la RDC*) component of the "*Stabilisation de l'Est de la RDC pour la Paix*" (STEP II) project. It also works closely with a number of organisations involved in waste collection and processing, like Plastycor – a startup of young entrepreneurs who are trying to reuse plastic waste to produce paving stones and decorative items. Despite these combined efforts, waste management remains a real problem, with the city council and its partners unable to collect all the waste produced. On the one hand, there is a low rate of household

subscriptions to waste collection organisations. Of the 277,400 households in the city, only 1.08%, or around 3,000 households, subscribe to waste disposal associations, most of which are located in the commune of Ibanda (BEGE-RDC, 2020). In addition, the city council and its partners do not have enough trucks to evacuate waste to specially designed landfill sites (Siyamu, 2022). Added to this is the problem of urbanisation and uncontrolled construction in the city.

Moreover, Bukavu's population has limited access to safe drinking water (Legge et al., 2022). A shocking 90% decline in access to safe drinking water occurred between 2003 and 2019. This critical situation stems from the city's outdated infrastructure. Its water treatment plant, built in 1954, was designed for a small fraction of the city's current population. Even with a doubled capacity, the plant struggles to meet the needs of over 1.3 million residents – a staggering 20 times its intended capacity. This burden on the system results in unreliable service, with piped water primarily reaching wealthier neighbourhoods. Also, in some of these neighbourhoods, piped water originates from the same Lake Kivu that is used for waste dumping (Masilya et al., 2021). In lower-income neighbourhoods where pipe water is unavailable, people use rainwater, springwater or well water. However, rooftop water can be dirty, while open-air wells and springs can be contaminated. While organisations like MercyCorps and American Refugee Committee (ARC) are attempting to improve access to safe drinking water, the cost remains a significant barrier for many residents.

Indeed, cases of cholera in this city are due to the consumption of unsafe water. In May 2023, the city had recorded more than 230 cases of cholera, according to the epidemiological office of the provincial health division. The health system faces many challenges, including lack of coordination and organisation of activities between health system levels, political priorities conflicting with scientific evidence, lack of coordination and communication between prevention programme actors, foreign organisation assistance in resource provision, community outreach, training of healthcare workers, and inadequate access to and funding for personal protective equipment and hygiene materials and functional communal handwashing stations (for example, during the Ebola and Covid-19 crises).

2.4. Price volatility, taxation and corruption

Food prices in Bukavu have been unstable in recent years, with a significant increase in the cost of food over the past three years. This is due to a number of factors, including the precarious security situation in the rural food-producing areas of South Kivu, the resurgence of armed groups that has influenced population displacement and non-access to agricultural zone production, the depreciation of the CDF, and the conflict in Ukraine and Gaza (Gouvernement RDC, 2020; IPC, 2021). The depreciation of the local currency (CDF) compared to the US dollar during the last five years has impacted the purchasing power of multiple categories of the population. According to the Central Bank of the Congo (BCC) and the International Monetary Fund, the year-to-date inflation rate has risen to 23.3% in 2023 from 9.1% in 2022 (BCC, 2023).

A recent report from the Development Indicators Analysis Unit (CAID: Cellule d'Analyse des Indicateurs du Développement) shows an increase in price of more than 10% in five foodstuffs in the DRC: palm oil (16%), cassava flour (40%), salt (13%), sugar (18%) and goat meat (89%) between December 2022 and November 2023 (CAID, 2024). Figure 8 and Figure 9 show the variation in price of cassava flour and beans, respectively. Figure 10 shows the volatility of prices for basic foodstuffs and the exchange rate of CDF to USD in two territories of South Kivu (which supply the city with agricultural produce) at various times.

Multiple taxes on food items are a barrier to food access. This is because taxes increase the cost of food and make it more difficult for people to afford it, especially low-income households. On 15 April 2022, the government of the DRC suspended the levying of value-added tax on 38 basic necessities, including foodstuffs.[9] Foodstuffs exempted during that short period include most animal products (certain types of meat, fish and dairy), some vegetable oils, sugar, tomatoes, salt and drinking water. In addition, in April 2023, the prime minister signed a decree extending the suspension of the levying of value-added tax on these products for the rest of 2023. However, this decision had not been applied to basic foodstuffs, such as maize flour, beans or rice – the most common food for low-income households. This means that these foodstuffs are still subject to multiple taxes, which makes them more expensive for people in Bukavu.

In addition, this attitude of making taxes rigid and very high tends to encourage people to negotiate with agents to not pay the required taxes. Vwima (2014) showed that the tax varies from one household (household traders and household consumers) to another. The social relations between households and tax collectors on the Congolese borders in Bukavu have a major impact on whether the tax is paid. This approach hinders both the food providers (and, by consequence, the consumers), but also the ability of the state to provide adequate services (which may encourage and help food providers to even pay more taxes). Many people suspect that this corruption system is conducted with the "blessing" of political authorities to whom some of this money is paid by field agents, an institutionalised corruption, as described by Kodila-Tedika (2013) and Nkuku (2021).

[9] Ministerial Order No. CAB/MIN/FINANCES/2022/014 of 15 April 2022 suspending the levying of value-added tax on basic necessities.

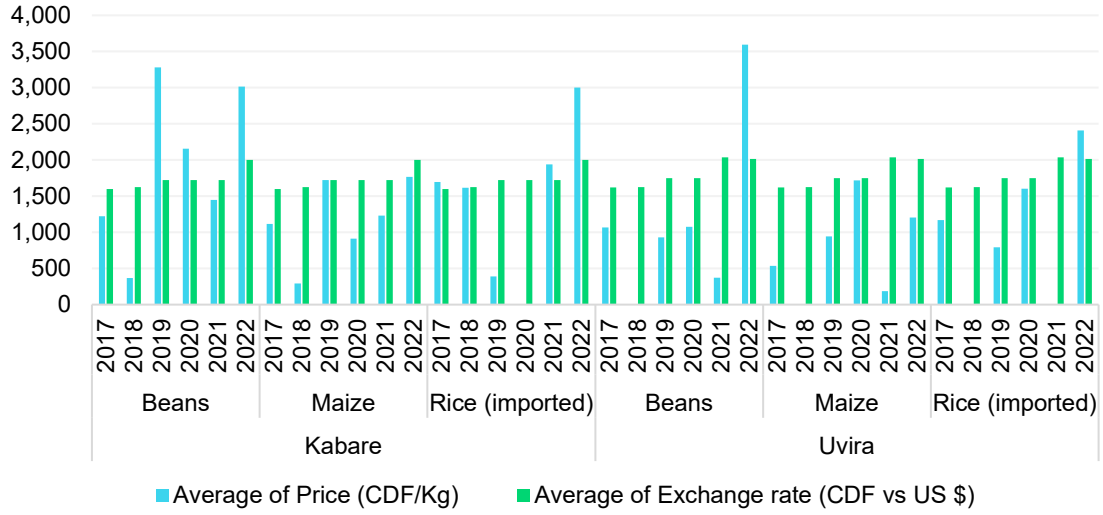
Figure 8: Price of cassava flour in DRC (CDF/kg)

Note: In blue, the average from 2018 to 2022; in orange and grey, price in 2022 and 2023, respectively.
Source: CAID.

Figure 9: Mean price of beans in DRC (CDF/kg)

Note: In blue, the average from 2018 to 2022; in orange and grey, price in 2022 and 2023, respectively.
Source: CAID.

Figure 10: Food prices and exchange rate of two South Kivu territories



Source: CAID.

2.5. Understanding the political drivers of food security

2.5.1. How significant is food security to the city and national political elite?

Politicians make many promises to improve food security, such as investing in research and development, improving access to water and irrigation and promoting climate-smart agricultural practices. For example, in October 2019 the head of state promised to help develop sustainable food value chains during the inauguration of the IITA/Kalambo agronomic research station:

> "I can ensure that no province of the Democratic Republic of the Congo will remain on the sidelines of this march towards achieving self-sufficiency eating. Beyond the Democratic Republic of the Congo, I would like to reassure our neighbours in Rwanda and Burundi that this centre will be an important link in sub-regional integration at the agronomic level, so that with common agricultural policies, we can reach the sub-regional level and provide our populations with sufficient and decent food that meets World Food Fund standards."

While the Congolese government may express support for food availability through rhetoric, there seems to be a critical disconnect between political pronouncements and the lived experiences of citizens and business operators. A case in point is the government's response to the maize crisis in Katanga. In an attempt to address the shortage, a team of government officials was dispatched to Zambia and South Africa. However, this mission faced significant public criticism. Many interviewees, along with citizens generally, felt that a solution could have been found domestically. They argued that if the resources spent on the foreign mission had been invested in supporting local maize production, the crisis could have been mitigated.[10] Further undermining public confidence, the government subsequently pledged financial assistance to agricultural entrepreneurs. However, this commitment was quickly overshadowed by the announcement that the wife of a government official involved in the foreign mission had harvested maize from her own plantations. This sequence of events led many, including interviewees, to believe that the mission and subsequent promises were intended to benefit a select few, rather than genuinely address food security concerns.

While some interviewees in informal settlements acknowledged the efforts of some political elites, such as the head of the Congolese Senate, who built a drinking water source in their settlement, others expressed scepticism about the motives behind these actions. Focus group discussions revealed a prevailing sense of distrust among citizens towards the motivations of political elites. One participant attributed the construction of a water source to Lukwebo's 2018 election campaign, suggesting a cynical view of such projects as mere vote-seeking tactics. This distrust extends beyond the water source itself. The participant raised concerns about the water's unknown origin, highlighting a lack of transparency surrounding the project.[11]

[10] Interview with the president of the Congolese Consumers' Federation.
[11] Focus group with consumers in an informal settlement in the Ibanda commune.

Indeed, promises and social plans in the food security domain offer a chance to win elections and increase legitimacy for the political elite. This is one of the pillars on which past and present governments base their legitimacy and give hope to the people. Governments have always initiated ambitious projects in this domain. For example: the Bukanga Lonzo project (Oakland Institute, 2019), the Agriculture Transformative Agenda[12], the national nutrition programme (PRONANUT), the Growth and Poverty Reduction Documents (DSCRP 1 and 2) and so on.

The government's goal is to end hunger and improve nutrition by 2030. The government is planning to collaborate with the education, training, research, gender and employment sectors to promote healthy eating habits, establish technical schools, train women in trades and support the marketing of women's products.

In addition, the government wishes (by 2030) to:

- End all forms of malnutrition, including meeting internationally agreed targets on stunting and wasting among children under the age of five by 2025.
- Ensure the viability of food production systems by implementing resilient agricultural practices that increase productivity and production, contribute to the preservation of landscaping, strengthen the capacity to adapt to climate change, and improve land and soil quality.
- Double agricultural productivity and small-scale food producers' incomes by 2030, focusing on women, indigenous peoples, family farmers, herders and fishermen, among others, by ensuring gender equality.

2.5.2. How and how much does political settlement shape outcomes?

Large plantations and agricultural concessions are currently owned by politicians, business operators and, in some cases, high-ranking army officers. Some of these landowners have opted for sharecropping, an agrarian system in which the landowner distributes portions of land to small farmers in return for a share of the crop production. This gives the landowners significant power over the sharecroppers, as they can influence their choices during elections and mobilise them to vote for a particular candidate. In addition, many of these concessions, which once produced a large quantity of food, are no longer being adequately exploited by their new owners (van Leeuwen et al., 2022).

Moreover, in order to get elected, political candidates often emphasise wellbeing, health and nutrition in their political programmes. However, these promises are often not reflected in concrete actions. For example, during the 2011 elections, some candidates opened public restaurants where people could eat for free. While this may seem like a positive step, it was ultimately a superficial gesture that did not address the root causes of malnutrition and food insecurity. These restaurants were often closed after the electoral campaign. Political ideas at the city and national levels have a significant influence on policy and results for nutrition and food security programmes.

[12] See Agenda de la Transformation Agricole website (accessed 3 March 2025).

To improve food security, political leaders need to stop making empty promises and start taking concrete steps to address the underlying causes of malnutrition and food insecurity. They need to invest in sustainable agriculture, improve access to clean water and sanitation and strengthen the healthcare system. They also need to address challenges related to food distribution and retail, such as recognising the crucial role of street food vendors, finding strategies to assist them, and controlling the sale of highly processed foods.

2.5.3. Reasons for system failures, fragmentations and externalities of health, wellbeing and nutrition

Twenty years ago, Bukavu was controlled by an armed group and disconnected from the national government. This led to a focus on restoring peace and stability, rather than food security. There were also internal and external refugees, which had an impact on food availability and health. In 1994, for example, more than a million[13] Rwandan Hutu refugees entered the city. Some were repatriated, while others remained in the province. Their entry had an impact on food availability and health, and this continues to be the case with internally displaced people (IDPs) still present in Bukavu (Harbeson and Rothchild, 2023).

Additionally, there is a lack of coordination between the many actors involved in food, health and nutrition in the city. This is due to a huge overlap in their objectives and scope, as well as a lack of activities to implement their objectives. This has led to a lack of progress in addressing malnutrition, which has been endemic in South Kivu since 1960, particularly in the informal settlements. Unfortunately, there is a focus on curative measures, such as providing medical treatment for malnourished children, rather than on prevention measures, such as improving access to food, clean water and sanitation. It is important to build consensus and coordination between these stakeholders to develop an effective strategy for addressing malnutrition.

The provincial government has identified armed conflict, limited access to healthcare, difficult access to farmland, and inadequate nutrition as the main causes of malnutrition in South Kivu. These factors have created a vicious cycle of malnutrition, poverty and disease. To break this cycle, it is essential to address the underlying causes of malnutrition. Thus, in October 2021, the vice governor set up a multisectoral committee to fight malnutrition. The committee's goal is to reduce stunting in children aged from 0 to 23 months by addressing the determinants, or causes, of undernutrition.

2.6. Groups vulnerable to food insecurity

Despite the lack of available demographic data for each vulnerable group in Bukavu, food security issues mostly affect the following groups:

1. **Children** are at high risk of undernutrition, especially those under the age of five, who live in poverty, in large families and whose parents are less educated. Many children do not have access to a healthy diet and food, since their parents

[13] See ReliefWeb press release, 27 October 1996 (accessed 4 March 2025).

lack adequate information or cannot afford it (Kambale et al., 2016). Families often seek both modern and traditional medicine to treat their children's illnesses, and traditional healers are the preferred source of information for families regarding certain childhood illnesses and insufficient breastmilk. Community health workers frequently advise families, but rarely provide nutrition counselling.

2. **Pregnant women** are at risk of nutrient deficiencies, which can have serious consequences for both mother and baby. A study in 2020 found that only 20% of pregnant women were consuming enough iron, 30% were consuming enough folic acid, and 40% were consuming enough vitamin A (Moumin et al., 2020). These nutrient deficiencies often lead to preterm birth, low birth weight and birth defects.
3. **Breastfeeding women** are often working long hours (as housekeepers, doing unpaid housework), which leaves them with little time to prepare healthy meals for themselves and their babies. Women in low-income households are often the decisionmakers for food choices, but their own food security is often disrupted, due to a lack of time and resources. Women who are the primary breadwinners may have to work long hours in income-generating activities, such as small businesses or portering, which leaves them with little time to eat well and can lead to stress and poor nutrition (Kambale et al., 2018).
4. **People with disabilities and HIV** are often marginalised and discriminated against, which can make it difficult for them to access food, healthcare and other essential services. This can lead to food insecurity, malnutrition and chronic health problems, which can have a significant impact on their quality of life.
5. **Elderly people** often have little access to social services and basic needs, and they are at high risk of food insecurity, due to their lack of resilience (Vwima et al., 2022).
6. **Internally displaced people**. Conflict in rural areas displaces farmers and herders, depleting food sources and causing food shortages in the city, but this pressure is experienced more by farmers who fled villages with little to nothing to sustain them. Bukavu is home to many NGOs and UN agencies, but they provide little medical treatment or food rations to IDPs. Both state and non-state actors have limited knowledge of the situation of IDPs (Jacobs and Kyamusugulwa, 2018).

3. Actors, collaboration and governance of food security

3.1. State and non-state actors

3.1.1. Government services

Several public institutions are involved in nutrition and health. They include the provincial ministries, inspectorates and divisions of both agriculture and health, the OCC and the General Directorate of Customs and Excise (DGDA). These are national services with provincial offices in Bukavu. Their mandate is to increase food production, prevent malnutrition and check the quality of imported and locally produced food. However, they are chronically underfunded, which means they often struggle to provide basic services, let alone design and implement innovative programmes to

improve the city's residents' nutrition. They are also bogged down by bureaucracy, which can make it difficult to implement programmes and projects in a timely and efficient manner. Meanwhile, corruption undermines the effectiveness of many public institutions. Indeed, many agents invest their time taking care of diverse channels through which they can earn some off-the-book income, rather than providing the outcomes for the public for which the institution was made.[14]

3.1.2. International bodies

Several UN agencies and other international organisations work on nutrition. These include the Food and Agriculture Organisation (FAO), the United Nations International Children's Emergency Fund (UNICEF), the World Health Organisation (WHO), the World Food Programme (WFP), the Office for the Coordination of Humanitarian Affairs (OCHA), Rikolto, Médecins Sans Frontières (MSF), World Vision, the Global Nutrition Cluster (GNC) and Mercy Corps. Some of these organisations focus specifically on healthy diets (UNICEF and WHO), while others concentrate on food security. These organisations provide technical assistance, funding and other resources for nutrition and healthy eating programmes. Some provide direct assistance to malnourished people. These international bodies and some national NGOs are grouped together within the nutrition cluster led by UNICEF and the food security cluster led by WFP in South Kivu. However, they often focus on rural areas, where malnutrition is often more severe than it is in the city.[15]

3.1.3. Research centres

Research centres and programmes are working to combat malnutrition and promote a healthy diet, among them, the HarvestPlus programme, the Regional School of Public Health of the Université Catholique de Bukavu (ERSP-UCB), the Therapeutic Nutritional Centre (CNT) of the Bukavu Provincial General Reference Hospital (HPGRB), the Observatory of Non-Communicable Diseases (OMNT), the International Institute of Tropical Agriculture (IITA) and the National Agronomic Research Institute (INERA). Research centres aim at improving nutrition for low-income groups through biofortified crops, raising awareness of the importance of healthy diets, developing new varieties of crops that are richer in nutrients, and writing papers related to food security. They face several challenges. They are underfunded, and most of their limited funds originate from international donors with a diverse range of agendas (to the best of our knowledge, the DRC government does not have a fund for research on nutrition or any other topic that these centres could rely upon on a regular and more consistent basis). Due to this, they tend to prioritise the most visible work, which may not always be the most impactful. Thus, they have short programmes and provide quick fixes for specific nutrition problems, whose results can be used to secure the next wave of funding, but they rarely invest energy in thinking about the city's nutrition on a larger scale and in

[14] Focus group with OCC staff.
[15] Focus group with staff from the City Hall (sanitation unit) and with consumers in informal settlements in Ibanda.

the long term. As a result, very few holistic plans to improve the overall nutrition of the city have been put in place so far, despite the presence of multiple research centres.

3.1.4. Local NGOs

Some local NGOs are working on nutrition. These include Centre OLAME, Anti-Bwaki Committee (CAB), Kesho Congo and MALISHO BORA. Local NGOs improve nutrition through nutrition education and food assistance for healthier diets. Some NGOs focus on low-income groups, and others on women or children. However, local NGOs being funded by international donors (they have little to no support from the national and local governments) are restricted to the donors' agendas, which also often focus more on rural areas.

3.1.5. Businesses and suppliers

Businesses involved in the food system, such as input suppliers, traders, large grocery shops, informal street vendors and restaurants, play a significant role in facilitating access to food. However, as they are profit-driven, they do not focus on promoting healthy diets, since there is no financial or reputational incentive to do so. Formal and informal traders sell a variety of foods, both imported and locally produced. They can be found in big shops on the city's main streets or in small stores in various neighbourhoods. Large grocery shops also sell a variety of foods, but they are generally more hygienic than informal vendors. However, they sometimes sell foods past their use-by date, which can also be risky for consumers. Informal street vendors are the least likely to sell food that meets hygienic standards. This increases the spread of foodborne illnesses (to children and women), especially among low-income groups, who are more likely to consume food from these vendors. Some street vendors also sell food that was cooked or stored in unsanitary conditions. Restaurants play a role in increasing easy access to food. However, they often do not offer healthy options. Cheap restaurants are often found in markets or along roadsides in the open air. They often lack access to clean water, which can lead to food being cooked in unsanitary conditions. They also may not have access to proper waste disposal, which can contribute to the spread of disease.

3.1.6. Consumers

Members of the public play an important role in the health, wellbeing and nutrition domain as consumers. Their location, income and education may limit their access to and consumption of sufficient and healthy food. There is a League of Consumer Services in Congo Kinshasa (LICOSKI), a consumer rights organisation that also operates in Bukavu, warning consumers about food safety and rising food prices. In 2022, LICOSKI warned of rising food prices, pointing to imports and low production as the causes. This shows that, despite some civil society organisations being aware of the need for healthy diets and wellbeing, consumers are still not always able to access

healthy foods.[16] Low-income groups are especially affected by limited access to healthy foods (due to affordability and low access to grocery shops).

3.2. Collaboration among key actors

Local government, international organisations, research institutions, NGOs and private companies each play distinct roles and have varied duties in enhancing food availability. Increasing food production, promoting healthier nutrition and evaluating the quality of imported and domestically produced food fall under the responsibility of government services. International organisations support nutrition and healthy eating campaigns through technical assistance, funding and other resources. The research facilities are trying to improve the nutritional value of foods, increase awareness of the significance of healthy diets, and create novel strategies for preventing and treating malnutrition. Through food assistance and nutrition education, local NGOs enhance nutrition. Businesses play a big part in making food more accessible, but they do not emphasise healthy eating. As customers, the general public is crucial.

The South-Kivu Nutrition Conference 2016, which was held in Bukavu, is a good example of how these different stakeholders can come together to collaborate on improving nutrition in the city. The conference was co-organised by the provincial government of South Kivu, the Provincial Multi-sector Nutrition Committee, and the Provincial Ministry of Public Health with the support of United Nations agencies (UNICEF, FAO, WFP), development partners, the science network, the private sector and civil society. The conference brought together policymakers, stakeholders and nutrition experts to discuss the nutritional situation in South Kivu and develop a roadmap for improving nutrition in the province. A nutrition stakeholders' exhibition fair was held in conjunction with the conference to highlight their initiatives to combat malnutrition in the province. Additionally, the event served as the platform for the television programme, "The voices of children" (*La voix des enfants*), which brought together child reporters, UNICEF and the national health minister to address the province's child nutrition issue.

The topic of food security frequently brings together government agencies, international organisations, research institutions and regional NGOs. Together, they create and carry out initiatives aimed at enhancing the nutritional status of city citizens. There are certain difficulties with this collaboration, though. For instance, government services are frequently underfunded and clogged with red tape. As a result, they may find it challenging to carry out initiatives and programmes on schedule and effectively. Additionally, international donors with a variety of objectives frequently finance both global organisations and regional NGOs. This may hinder their capacity to work well together. HarvestPlus is a research initiative that collaborates with local communities to improve nutrition in the DRC by promoting the production and consumption of

[16] See: "'Nous allons mourir de faim': En RDC, les habitants font face à une augmentation du coût de la vie", TV5MONDE – Informations (accessed 10 February 2025); and "Journée M de l'alimentation: La population n'accède pas à une bonne alimentation (MIZO KABARE)", Libre Grands Lac (accessed 10 February 2025).

biofortified staple food crops (cassava, maize and beans). It works with multiple partners, including the government, and has begun technical assistance on a major biofortification capacity strengthening project.

3.3. Governance

The right to food is enshrined in multiple national laws and international treaties that the DRC has ratified. Article 47 of the 2011 Constitution guarantees the right to health and food security to all citizens. In line with this, the National Multisectoral Committee on Nutrition (CNMN-RDC) was created by Decree No 15/042 of 2015. Also, the DRC adhered to the 2015 consensus on the Sustainable Development Goals (SDGs), the 2014 Malabo commitments, and the African Charter on the Rights and Welfare of the Child. In addition, the country has several policies and programmes whose visions are always in line with Article 47. As a crosscutting issue, nutrition involves virtually all ministries: agriculture, livestock, fisheries, public health, labour, human rights, economy, industry, and so on**.** At the government level, the prime minister coordinates government action to achieve nutrition and food security objectives, although this coordination is not very effective. The WFP and UNICEF, respectively, are in charge of leading two distinct clusters of NGOs, one for nutrition and the other for food security. In order to better address malnutrition, UNICEF assists families whose children have severe acute malnutrition. However, a number of NGOs operating in this field choose not to attend cluster meetings, which makes it harder to coordinate interventions.

The DRC's 2008 decentralisation increased the city’s administrative and financial autonomy. However, Law No 08/016 of 7 October 2008 limits the city’s roles in sanitation, hygiene and drinking water, not nutrition. Despite this, the city hall manages the sale of food along the roads and markets. This loophole in decentralisation means that nutrition and healthy food services (provincial health inspectorate and division, provincial inspectorate of agriculture, fisheries and livestock, and other quality control services) fall within the remit of the provincial rather than the city’s services. This presents the risk that all the focus may be orientated towards agricultural production in the province, rather than changes in the other challenges that prevent city residents from accessing sufficient and healthy food. Several laws and programmes have been put in place by the national government on nutrition and food security, but so far, Bukavu’s urban authorities have not initiated any programmes. This is a major problem, as the city should play a key role in ensuring that all its residents have access to food (in addition to all national and provincial efforts for increased agricultural production). Additional challenges make it harder to guarantee access to sufficient and healthy foods for Bukavu’s residents, as well as other cities in the DRC. These include: the non-application of laws and legislative texts related to food safety, the lack of political interest in nutrition (aside from electoral campaign speeches), the failure of agricultural

production programmes (for example, the Bukanga Lonzo programme[17]), the low funding of the nutrition sector by the government, and the low access to agricultural credit for farmers. Regarding legislative texts, most of them are not effectively implemented because of weak state authority.[18]

To win elections, political elites are interested in nutrition issues. Unfortunately, despite their electioneering speeches to this effect, these elites do not realise projects to improve nutrition. Indeed, Congolese governments have always felt that to develop the agricultural sector, it is necessary to set up agro-industrial parks and agricultural mechanisation. However, the majority of Congolese farmers practise family farming, so they are not taken into account by such programmes. The Congo Agricultural Credit Bank has existed in the past, but it has gone bankrupt because of state interference and many insolvent loans. In addition, it seems that family farmers did not have access to it (Rikolto, 2015).

A glimmer of hope does emerge, however, in the fight against malnutrition. The government has put in place several programmes on nutrition and food security, including the National Nutrition Programme (PRONANUT), the National Strategic Plan for Nutrition (PSN), the National Multisectoral Nutrition Programme (PNMN) and the National Food Security Plan (PNSA). The establishment of the PRONANUT in 2000 signifies a crucial step towards a more coordinated and effective approach. PRONANUT's multipronged strategy, encompassing community involvement, health centre support and specialised care for severe cases, offers a window of opportunity to improve the nutritional status of vulnerable populations. This positive development, coupled with a decrease in national malnutrition rates and the country's commitment to the Scaling Up Nutrition (SUN) movement,[19] suggests a growing recognition of the importance of nutrition and the potential for further progress. Additionally, the 2016–2025 National Multisectoral Strategic Nutrition Plan (PNSMN) demands that the agriculture sector address malnutrition, with greater availability and access to a diversified food basket and the inclusion of biofortification of crops and fortified food. Interventions are spatially targeted to map nutritional outcomes with production, access and utilisation constraints (Marivoet et al., 2019).

[17] The Bukanga Lonzo programme was a large-scale agricultural project launched by the Congolese government in 2014 in partnership with the South African company, Africom Commodities. The project was ambitious, with plans to produce corn and other agricultural commodities on 80,000 hectares of land. However, the project collapsed in 2017, after only three years. Africom blamed the government for non-payment of expenses, while the government blamed Africom for mismanagement. See Oakland Institute (2019).

[18] Among these texts, we can list: Ministerial Order No 004 of 1 April 2008 adopting 94 CODEX Alimentarius as national standards; Agricultural Law No 11/022 on fundamental principles relating to agriculture; Ministerial Order No 085/CAB/MIN/AGRIPEL/2016 of 1 April 2016 fixing the standards of packaging of agricultural products for export and their derivative, Ministerial Order No 1250/CAB/SP/MIN/006/CPH/OBF/2015 on provisions relating to the registration and marketing authorisation of food supplements, Ordinance 74-241 of 22 July 1953 on the transport and trade of meat in cities and urban districts (see Konrad-Adenauer-Stiftung, 2020) and the 26 July 1910, Decree: Manufacture and Trade of Foodstuffs.

[19] See https://scalingupnutrition.org/ (accessed 10 February 2025).

4. What are the solutions being proposed, and by whom?

This section examines the proposals put forward by various actors on issues pertaining to Bukavu's food availability and access. Two important areas for action have emerged from discussions with local communities, NGOs, foreign organisations and government agencies.

4.1. Rehabilitation of the National Road 5 and support for farmers

DRC's national road (RN) network plays a vital role in connecting Bukavu internally, and influencing the city's food security. The RN3 and RN5 roads, in particular, pass by a low-density area, from which they could easily collect food. All the stakeholders, particularly truckers, unanimously showed that the rehabilitation of these roads would boost agricultural production and increase the city's food supply. The RN5 passes through the Ruzizi Valley and Fizi, the two areas with high agricultural potential, but has unfortunately known cases of kidnapping, discouraging many operators. Additionally, truckers are not allowed to use an alternative road, due both to Rwanda's restrictions on food products and trucks being in poor shape.[20]

The rehabilitation of RN5 is a long-awaited project, initiated by the government, that would have a significant impact on the agricultural production and food security of Bukavu. Indeed, the agricultural areas of the Ruzizi valley and Fizi are less densely populated, so the bulk of their production could easily reach the city if there were good roads. During focus groups and interviews, some consumers declared that food scarcity is due to a lack of good roads. They assume that the rehabilitation of the Ngomo Road could significantly reduce their food dependence on foreign countries. They also highlighted that the same food produced in Ruzizi Valley (a part of the DRC) passes through Rwanda, and the Rwandan government sometimes refuses to let trucks carrying this food through. These respondents assumed that this situation was the root cause of the rise in food prices in Bukavu.[21]

On 22 July 2023, the Minister of Infrastructure, Alexis Gisaro, announced that the rehabilitation of RN5 would be carried out on the president's instructions. The work would be carried out with the help of a number of local companies and agencies. He underlined that the president's vision was to improve living conditions and the role of this road. Unfortunately, this is not the first speech in that regard, and at the time of writing, much is yet to be done.[22]

4.2. Aquaculture development in Lake Kivu

Although Lake Kivu is not overly rich in fish, it is a home to Lake Tanganyika sardine (*Limnothrissa miodon*) and Lake Tanganyika sprat (*Stolothrissa tanganicae*), a fish that

[20] Focus group with a food transporter via RN5.
[21] Focus group with business operators; focus group with consumers in an informal settlement in Ibanda; focus group with mothers selling at Nyawera market.
[22] See: "South Kivu: Launch of construction work on the Bukavu-Kamanyola road", *ActualitéCD*, 14 August 2023 (accessed 10 February 2025).

is eaten whole. This fish is a popular food for all categories of households and plays an important role in Bukavu's food security. Therefore, its sustainability is essential, and fish stock is declining in Lake Kivu. In addition, only a small part of the production of Lake Tanganyika, which is highly diverse in fish species, reaches Bukavu, due to the lack of storage, drying racks and poor transport infrastructure. Thus, it is necessary to promote sustainable fishing and develop aquaculture on Lake Kivu.

Lake Kivu has a high potential for aquaculture, which a small group of entrepreneurs is attempting to tap into, rearing tilapia in floating cages. Most of them had been supported in a pilot project funded by the Congolese government through the Industry Promotion Fund (FPI) and implemented by the International Institute of Tropical Agriculture. However, aquaculture and fish farming in South Kivu still require certain support (human, technical and financial). Some respondents estimated that the development of aquaculture and good fish stock management in Lake Kivu could contribute to the city's food security and extend to the Ruzizi River, for people living in informal settlements along this river.[23] The importance of developing this sector is justified by the fact that the lake's production is not influenced by a multitude of constraints (insecurity, farm access roads and so on), as is the case for agricultural production in the province's rural areas.

4.3. Formalising the food economy

Since informal food vendors play a major role in low-income household food security, formalising parts of this sector (enhancing access to infrastructure, grouping them into cooperatives, crafting adapted taxes) may help improve the quality and hygiene of the food they provide. To make sure that any suggested procedures do not result in marginalisation or greater costs for vulnerable consumers, it is imperative to thoroughly examine them. Authorities should consider this aspect of access to food in urban planning. During the focus group discussion with agents of the City Hall, respondents emphasised the existence of such a project (enhancing access to infrastructure for informal food vendors) in 2021, with the urban development project (PDU) funded by the World Bank group. That project planned to rebuild Nyawera Market, in order to fight against informal markets in the city. Indeed, according to these respondents, the informal market is a source of waste and unsafe foods, and exposes vendors to road traffic accident risks. While activities to combat informal markets continue, vendors interviewed in these informal markets stated that they lost goods, due to the excess brutality of the police, and affirmed that, paradoxically, they were still paying taxes in those informal markets. However, the construction of this market failed when it was decided to move periodically out of the market to another site. Respondents from the City Hall assumed that it was difficult for buyers (consumers) to follow their traders to the new place, influencing the return of traders to their usual places.[24] This illustrates

[23] Focus group with consumers in an informal settlement in the commune of Ibanda.
[24] Focus group with staff from the City Hall (sanitation unit).

the importance of involving informal sector traders in processes aiming to formalise markets to ensure that interventions meet their needs as well as those of consumers.

4.4. Strengthening food systems: nutrition centres, education and collaboration

Despite the high rate of malnutrition, there are fewer nutritional centres in the city. The few nutritional centres that exist are sometimes supported by NGOs, UN agencies, and so on. Additional support and coordination for these centres would enable them to broaden their range of actions to reduce this malnutrition rate. Some local, national and international NGOs are already working in the nutrition domain and require additional support to meet the challenge of malnutrition.[25] With free education from the age of six to 14 years, schools became central locations to provide nutritious lunches and basic nutritional education. They can also help promote healthy nutrition in the pupils' families, in addition to information directly provided to adults. School canteens can quickly tackle student hunger, and enhance learning quality. The National Ministry of Education aims to launch pilot programmes in ten schools, prioritising disadvantaged areas. By providing much-needed nutrition, these canteens could combat childhood hunger and malnutrition, while also improving student focus and academic achievement. The success of this pilot programme holds promise for a nationwide rollout, offering a beacon of hope for students across the country. One caveat is that many such pilot programmes have launched with little to no cases of further extension of the tested initiative.

Furthermore, churches, Christian groups, women's associations and other local groups play a vital role in community education. A network of churches works closely with health centres, sometimes partnering with the government, and leveraging community relays going door-to-door to raise awareness among parents and pregnant women about the importance of keeping essential medical appointments. They have also provided essential medicines to health centres treating critically malnourished children. Researchers can collaborate with such groups and provide simpler educational materials in Swahili, incorporating traditional knowledge and addressing specific community challenges. Some NGOs are members of the nutrition cluster. Unfortunately, most of these organisations do not address the root causes of malnutrition.[26] In recent years, several research centres, such as IITA, HarvestPlus and the Regional School of Public Health (ERSP-UCB), are conducting various projects in both food security and nutrition. Afrifoodlinks, an EU-funded project, tackles the root causes of food insecurity and environmental strain in Bukavu. Their approach focuses on transforming urban food systems, recognising that city residents make crucial dietary choices that impact their health and the environment. They target five key areas to improve Bukavu's food security: improved public hygiene; food safety awareness; strengthened food governance; modernised food infrastructure; and food safety education. These are some of the projects identified, but the city has hosted many more since South Kivu province has undergone decades of war, hunger and poverty.

[25] Interview at the Therapeutic Nutritional Centre at Bukavu Provincial General Hospital.
[26] Focus group with staff from the City Hall (sanitation unit).

The key problem is that these various initiatives are disconnected. There is no clear common vision of how they should all contribute to food security and no effort to enforce alignment of different efforts towards such a vision is.

5. Key findings from community FGDs and KIIs

5.1. Factors enabling or limiting food availability and uptake of healthy diets

5.1.1. Enabling factors

- **Geographical relief diversity:** Bukavu is located in a region that has a diversity of important agroecological areas for crop and animal production. This region has areas at high, medium and low altitudes that could produce a significant diversity of food, which would avoid deficiencies in dietary nutrients for the city's population. Considering the difference in climatic factors in these areas (temperature, precipitation, and so on), these zones have agricultural production spread throughout the year, which implies that the population of Bukavu would have access to food throughout the year (if all agricultural production conditions were effectively guaranteed).
- **Humanitarian interventions:** Though nutrition is a government's priority, most non-emergency nutrition interventions are still carried out with external funding and focus more on people affected by disasters that receive media attention. Though interventions should focus on prevention, treatment and promotion, in practice, governmental funds are only available when people are at risk of dying from hunger, and the disaster that affected them attracts international attention. Non-emergency interventions are the only sustainable solution, since they take a multisectoral approach that includes health, nutrition, education, agriculture and the private and public sectors. They recently included a national nutrition policy on infant and young child feeding and protocols for the management of acute undernutrition. Indeed, these initiatives are unheard of by the majority of residents who have not undergone a disaster. "I've never received food assistance from the government", one resident said. "The government only helps people in the event of a natural disaster."[27] Indeed, Bukavu's location in a seismically active region and its steep slopes and mountainous terrain make it vulnerable to natural disasters, such as landslides. These disasters can have a devastating impact on the Bukavu population's access to nutritious food, leading to food insecurity and malnutrition. The government can play a vital role in ensuring that Bukavu's population has access to nutritious food, even in the wake of natural disasters, by installing hotspots that enable the population to benefit from a nutritious food supply during and after natural disasters. These hotspots could be located in areas that are less prone to landslides and other natural disasters and could be equipped with storage facilities for nutritious food items.
- **Households' own food production:** Some households in Bukavu grow their own food on small farms, especially those in remote neighbourhoods like Panzi and Ciriri. These households have sufficient space to produce a few quantities of cassava, beans, maize and vegetables. In focus group discussions, some respondents showed that they only grow vegetables in those gardens,

[27] Interview with an informal vegetable vendor from an informal settlement.

especially in the rainy season.[28] Thus, despite having to buy carbohydrate- and protein-rich foods in the market, they can regularly add minerals and vitamins to their diet from their gardens. The proximity of Lake Kivu and the Ruzizi River (in which small and large fish are caught) to the city, as well as the street and door-to-door sale of fish, improve access to animal protein for the population. Respondents bordering the Ruzizi River believe that fishing in this river contributes to access to food and a healthy diet.[29]

- **The role of women in food choice**: The majority of the family's food is grown and prepared by women, who also raise small livestock and process food to reduce losses and add value for the market. Women's involvement in food processing and production has a direct effect on the variety of diets in the home. Their financial independence affects their decisionmaking, including on food choices. Women's organisations (such as ACOSYF, SARCAF, APEF and AFEM) promote women's empowerment and enhancement of food security, but they face multiple challenges, including funding.

5.1.2. Factors limiting community's uptake of healthy diets and food availability

- **High cost of food and healthy food:** Considering the daily income of less than USD 1, food (especially healthy food) seems too expensive for most people. Indeed, despite Bukavu being far from the ocean, local healthy foods remain more expensive than imported foods. This is because healthy foods are often more perishable and require better processing, which drives up their cost. The price increase affects both low-income urban consumers and poor farming households, which have become net food buyers in most cases. Low-income residents, who spend a large portion of their income on food, are particularly vulnerable to rising food prices. As one fruit vendor in the Feu-Rouge market in Ibanda said, "Only the wealthy buy fruit on a regular basis. But we occasionally have customers who are forced to buy fruit for medical reasons. People like us, the harvesters, rarely buy fruit because our income is so low".[30] Respondents showed that the variability of the food price, mostly due to the exchange rate of local currency (CDF), has decreased the quantity of food consumed in several households.
- **Ongoing conflicts and armed groups:** Food availability is negatively affected by war and the presence of armed groups in the region. This situation affects both the productivity in rural areas and the food availability in the city. Food vendors have mentioned that the quantity of goods has significantly dropped with the resurgence of M23 rebels, which has increased the price of food. Indeed, respondents have indicated that these rebels have installed new taxes for food transporters. Apart from the fact that the presence of the rebels limits access to the fields, additionally, respondents explained the reduction of food caused by two other phenomena: 1) the sharing of harvest between rebels (30%) and the farmers, or 2) the land grabbing by rebels who produce their food. [31]
- **Mineral rush:** Most of the respondents have indicated that the mineral extraction in South Kivu province reduces the availability of food in the city.

[28] Focus group with consumers in an informal settlement in the commune of Ibanda.
[29] Focus group with the inhabitants of an informal neighbourhood in Ibanda municipality.
[30] Interview with a fruit trader at the Feu Rouge market.
[31] Focus group with vendors (potatoes, beans from Goma) and market representative at Beach Muhanzi.

They have explained that in the extraction sites, there is no agricultural production, and a large quantity of imported food in Bukavu is transported to these sites.[32] A transporter of food to mineral extraction sites has estimated that he transports more than 20 tonnes of food each week from Bukavu to a mineral extraction site. Unfortunately, food transporters to these sites indicated that they almost always come back to Bukavu with empty containers, unless they were lucky to come back with charcoal. These transporters indicated that the poor road conditions from mineral extraction sites to Bukavu are one of the major factors that discourage farmers from investing in agriculture. Indeed, due to the perishability of agricultural products (and the absence of processing in these sites) and the number of days that it takes a truck to reach Bukavu, farmers avoid the loss of their harvest; thus, they invest more in minerals than in agriculture.[33]

- **Closure of the borders**: Closing DRC's borders with Rwanda (from 3 pm to 6 am) had not received the unanimous consent of respondents with regard to food availability in Bukavu. Some food traders and consumers felt that the earlier closure of the borders had reduced the availability of food in the city, while others thought it had not had an effect.
- **Limited knowledge on healthy eating**: Many people do not have the knowledge or skills to make healthy food choices. This can be due to a lack of education, poverty or cultural factors. For example, a woman living in an informal settlement said, "For me, for example, the quantity of food is the most important. As long as the children have enough food on the table, they grow up healthy".[34]
- **Limited resources**: Some people do not have the resources to cook healthy meals. This can be due to a lack of money, access to cooking facilities, or clean water. For example, a person who lives in an informal neighbourhood (like Nyamugo) may not have access to a kitchen or clean water, which makes it difficult to cook healthy meals: "Yes, we are poor, we suffer, there is food, but money is lacking. We low-income people suffer a lot".[35] Furthermore, in some households, a balanced diet is still a luxury, even though some can afford to eat three meals a day. They are far from complying with the food categories recommended by health professionals, with many people relying on staples such as cassava, rice and beans. These foods are relatively inexpensive and easy to find, but they are not nutritionally complete.
- **Lack of time to cook**: Due to long working hours, childcare responsibilities or other factors, many people do not have the time to cook healthy meals. Indeed, many women work two jobs or have an informal job whose working hours have little to no regulation, aside from market forces. They may thus not have the time to cook a healthy meal for their children after they get home late and are very tired from work and, due to cultural pressure, they cannot ask their husband to support them in cooking or other domestic tasks, even if he has time. As one woman said, "My children only light the fire to prepare food when I get home. As a result, I don't have enough time to prepare when I get home

[32] Interview with the Beach Muhanzi Market's representative, with food transporters to mineral extraction sites.
[33] Focus group discussion with food transporters to mineral extraction sites (Kamituga, Misisi, Kitutu).
[34] Interview with a fish vendor at Nyawera Market in Ibanda.
[35] Interview with a vegetable vendor living in an informal settlement.

late. As a consequence, I'm forced to buy foods that don't take long to prepare".[36]

- **Lack of refrigeration**: Refrigeration is expensive and not always available in informal neighbourhoods, especially since very few areas of the city have reliable electricity. This can lead to food spoilage and the loss of nutrients. As one resident said, "We don't have a refrigerator or electricity at home, so we have to pay some neighbours who do, so that our food doesn't spoil".[37] The same is true for traders, who may have to pay to use a refrigerator at a market. This can lead to the depreciation of their products, as seen in this quote from a trader: "We kept it in the fridge and didn't even sell it yesterday... We're now selling them for 3,000 and 2,500 CDF".[38]

5.2. Factors contributing to poor city health

5.2.1. Poverty

Malnutrition, infectious diseases and NCDs are all related to poverty, with more cases of stunted growth, impaired cognitive development and elevated infection risk in poorer communities. People who live in crowded, unhygienic areas, such as informal settlements, are at an increased risk of catching infectious diseases like cholera, typhoid and malaria. People living in poverty are more susceptible to mental health issues like anxiety and depression, and are more likely to experience stress, violence and trauma as well.

5.2.2. Conflicts

People who are uprooted due to conflict or war frequently lack access to food, which can result in undernourishment. They are also exposed to the spread of infectious diseases like cholera, typhoid and malaria, as well as to mental health issues like depression, anxiety, violence and post-traumatic stress disorder (PTSD). The mental and emotional wellbeing of a person may suffer because of violence. Conflict and war can disrupt water and sanitation systems and subsequently lead to the spread of parasites and disease-causing bacteria. Additionally, stress, violence and trauma brought on by conflict and war can raise the risk of post-traumatic stress syndrome. Accessing healthcare can be challenging for people during times of conflict and war, as healthcare facilities may be harmed or destroyed, and healthcare personnel wounded or killed. As a result, those who are impacted by conflict and war are more likely to put off or avoid seeking medical attention, which may make their health issues worse.

5.2.3. Limited access to healthcare

Many people are impoverished and unable to afford healthcare. Health mutuality (insurance) has been initiated in several areas to help families soften the shock of expensive and unexpected health interventions, but its adoption is still very low.

[36] Interview with a vegetable vendor living in an informal settlement.
[37] Interview with a resident living in an informal settlement in the commune of Kadutu
[38] Interview with the informal vendor of meat in the commune of Kadutu.

Healthcare facilities are sometimes located far from where people live, making them difficult to reach, and a lack of transportation may compound this difficulty. Many people are unaware of where to find or how to obtain healthcare. Access to healthcare may be discriminatory for people with disabilities, HIV and other marginalised groups. As a result, the local population may not be able to receive the necessary treatment for malnutrition and is more likely to develop infectious diseases, NCDs and mental health issues.

5.2.4. Poor sanitation

Poor sanitation creates conditions that favour the growth and spread of disease-causing bacteria and parasites, leading to infectious diseases. Food and water become contaminated, making them unsafe to consume. Some people believe they live in a filthy and unhealthy environment because of poor sanitation. As a result, many of them have mental health issues.

5.2.5. Limited formal education

The poor health system is exacerbated by limited access to formal education. People do not often understand the risks involved in making better-informed health decisions. Uneducated people are more likely to engage in risky behaviours like smoking, drinking alcohol and not using condoms. They are also more likely to be unaware of early disease signs and symptoms, which can lead to delays in diagnosis and treatment. Furthermore, education can assist people in understanding and taking advantage of the healthcare system. More educated people also tend to be wealthier, have more options when it comes to food products, and have higher standards for food quality.

5.3. Household food basket

The staple foods are cassava, cereals (maize, rice and sorghum), other tubers (taro, sweet and white potatoes) and bananas. These foods are generally served with vegetables, fish, beans and meat, which helps to balance the family dish. On average, one to two meals are consumed per day.

- **Cassava:** Cassava flour is used to make the main staple food, *"ugali"*. Used alone or mixed with cornflour, cassava-based ugali is the mainstay of the meal on the table in Bukavu. Although cassava is only rich in carbohydrates and dietary fibre, it is the most consumed food in Bukavu, due to its accessibility (cassava grows in various and infertile lands of South Kivu). It is most consumed in low-income households. Indeed, DRC is the highest consumer worldwide of cassava, with 150kg per capita per year of cassava flour (Birindwa et al., 2023; FEWS NET, 2017). Ugali is served with vegetables, but the quantity of vegetables, fish or meat is insufficient in a number of households.
- **Cereals (maize and rice):** Used in combination with cassava to make ugali; maize flour is eaten but not accessible to all income groups. Indeed, maize flour contains more nutrients and fatty acids and can be packed with some minerals and vitamins (depending on the processing used). Although appreciated by people, maize flour is not widely consumed in low-income households, for three reasons: firstly, the high price; secondly, maize flour tends to be imported or to

pass through neighbouring countries (FEWS NET, 2017); thirdly, rural areas close to Bukavu do not have a high potential for maize cultivation, and the little maize that is produced is consumed in forms other than ugali, such as boiled or grilled corn. Several respondents declared that accessibility to maize flour had decreased, due to inflation (from 900 to 2,400 CDF per USD in the last seven years): a 50kg bag that was previously bought for USD 15 now cost USD 25 or even USD 30; these respondents underlined that their children were no longer satisfied with their meal. Compared to other cities (Uvira and Kalemie), Bukavu has the lowest rice consumption. Although the average rice consumption in South Kivu and Tanganyika provinces is 1.7kg/day/household, a recent study has shown that rice consumption is 1.4kg/day/household, or 0.18kg per capita. This is due to the higher price (USD 0.8/kg) of rice. In addition, only 23.9% of respondents showed an increase in rice consumption, while 49% and 27.1% showed a static and decreasing trend in rice consumption, respectively (Bulambo et al., 2023).

- **Vegetables:** Although high-income households consume vegetables, this is not the case in poor households. In both types of household, the quantity of vegetables consumed is low, and this quantity remains lower in low-income households than in high-income households. There is a stereotypical view in Bukavu that the consumption of vegetables is proof of poverty.[39] While there is some local production of vegetables, additional quantities are imported from Rwanda; vegetables in Bukavu include amaranthus, cabbage, cassava leaves, bean leaves, carrots, sweet potato leaves, and so on.
- **Fruits:** As previously stated, the consumption of fruits seems to be a luxury in low-income households, although fruits are consumed, especially in high-income households. In a focus group discussion with fruit traders in the Feu Rouge Market (a specialised market for fruits), respondents declared that most of their customers come from rich families or sick populations, for whom doctors have prescribed fruit consumption.[40] Fruits come from both imports and local production. However, consumers like fruits locally produced; thus, fruit traders deceive them, in order to sell their products imported from Rwanda, Uganda, Kenya and even South Africa. Common fruits include bananas, mangoes, avocados, passionfruit, plums, oranges, tangerines and pineapples.
- **Meat:** Mostly beef, goat, pig and chicken, meat is considered a luxury food in low-income households. It is mostly imported from Rwanda. According to veterinarians and butchers, 200 beef cattle from Rwanda, as well as 300 goats and 2,400 pigs, are slaughtered each week at Muhanzi, a market on the lake's shore. This importation is due, among other factors, to a lack of grazing land near Bukavu and insecurity in the surrounding villages. Most slaughterhouses have poor hygiene conditions. Only one (Elakat) provides the basic structure for slaughter, and accounts for 400 cattle per week, mostly from Rwanda. Meat traders get their supplies from the slaughterhouses, and then sell in public markets (on a set table) and along roadsides. Many traders prefer selling on the street because customers along the roads are less demanding in terms of quality, giving them an opportunity to sell slightly degraded meat.[41] To preserve and conserve meat, traders sometimes hire refrigerators. Clandestine slaughtering is common, despite the existence of slaughterhouses and the

[39] Interview with a woman living in an informal settlement in the commune of Kadutu.
[40] Focus group discussion with fruit traders at Feu Rouge Market.
[41] Interview with an informal vendor of meat at Beach Muhanzi Market.

public health risk this represents. Pig heads and intestines are also sold in the open air along roads and in public places. One of the traders interviewed stated that this food is consumed by all categories of the population.

- **Fish**: *Limnothrissa miodon* is a small fish eaten whole that is caught in Lake Kivu. Its low price compared to tilapia and its wide availability make it a favourite dish for both low- and high-income households, as well as the informal district population. Despite police harassment, traders of this fish prefer to sell it on roadsides, as their customers prefer not to enter the market, due to the dirtiness and overcrowding. These traders estimated that street selling is a marketing technique to influence customers' choices.[42] *Oreochromis nilotica* (tilapia) is the second most popular fish consumed, mostly by middle- or high-income households. In addition to Lake Kivu's limited production, tilapia is imported from Uganda and China and arrives in refrigerated trucks. Fish importers offer free ice to retailers, but many retailers find the quantity of ice insufficient to withstand Bukavu's intense sunshine. Fortunately, most of the time they sell all their fish within the day. When they do not sell all their fish, they pay for refrigeration in a business house or in households at USD 0.1/kg/day.[43] This facility is accessible mostly to retailers in Ibanda – those in other municipalities often lack infrastructures with good electricity availability.
- **Milk**: Few households consume milk (those that do are mostly middle- and high-income). Most of the milk consumed comes from Rwanda and is sold along roads or in the street market around Nyawera Market. Interviewed traders explained that they chose Nyawera Market because of its proximity to the Rwanda border and because it is closer to high-income households in Bukavu that regularly buy milk. Respondents estimated that it is difficult to sell milk far from the border because urban roads are in poor condition (especially in Kadutu and Bagira municipalities), which negatively affects milk quality during transportation. These traders highlighted their intention to sell locally produced milk, but they stated that this production is not available to them. They estimated that the quantity of local milk is low, and believed the poor roads and distance from the sites of production to the city could affect the quality of this milk.[44]

6. Conclusion and policy recommendations

Bukavu is one of the cities in the Democratic Republic of the Congo that has been most affected by population explosion, mineral rush and wars. These factors have taken a very heavy toll on the city's ability to reach food security. Even prior to the recent wars, Bukavu's food insecurity resulted from low soil fertility around the city, limited access to fertilisers and other agricultural inputs, poor agricultural feed roads, and the abandonment of agricultural zones production, due to insecurity in rural areas. As a result, local production is not sufficient to meet either the food demand in the city or in rural areas, which are considered agricultural production zones. In addition, while the mining sector has been reducing the agricultural workforce in many rural areas, Bukavu could rely on food imports as long as they were balanced with mineral exports. While

[42] Interview with an informal vendor of meat at Nyawera Market.
[43] Interview with an informal vendor of fish at Nyawera Market.
[44] Interview with a milk vendor along the road.

this was hard to achieve pre-war, recent developments make this balance even more vulnerable. Indeed, rapid population growth, massive displacements from rural areas to the city, urbanisation, and the setting up of informal settlements have further increased the city's dependence on imported food. This model is currently suffering from two factors: firstly, the city is not resilient to global trade shocks, such as Covid-19 or the war in Ukraine and Gaza; and secondly, most imported foods have a high carbohydrate content or are overprocessed.

The city's physical food environment includes formal and informal markets, and various types of restaurants. Although the informal market (especially street food) does not guarantee food hygiene and security (as the formal market does, in most cases) and is a source of public health issues, this type of market plays an important role in food availability. This is because income and ease of access are the primary drivers of consumer choices. Due to a lack of conservation facilities, many families are highly dependent on seasonality in terms of the type of food they can consume.

Due to the insufficient quantity and quality of food, 13.4% of children aged between six and 59 months and 6.5% of pregnant and breastfeeding women are underweight. The government and most stakeholders are unfortunately focusing their efforts on curative rather than preventative actions.

Despite the challenging food environment and the impact of mineral rush and continuous wars, the city has not yet developed a specific programme or plan to fight food insecurity and malnutrition. Undernourishment, overweight and NCDs coexist, making their management even more complicated. However, most participants in this study do not know the link between healthy food and the presence of NCDs in the city, which represents a high risk to public health and to the city's economic development.

Although the words "nutrition" and "food security" are commonly used by the political elite, in order to win elections in the city, there is no political will that illustrates an interest in enhancing food security and nutrition. On the contrary, governance of the food and nutrition sector has been characterised by corruption and embezzlement of funds for nutrition and food security programmes and a high taxation on foodstuffs, that sometimes profit the political elite. Although there are multiple stakeholders in the food sector (public and private), they tend to operate in isolation and under the "project model"; this model does not guarantee the sustainability of the system and creates a lack of central coordination at the city or province level, despite the existence of nutrition and food security clusters of NGOs that discuss almost exclusively humanitarian emergency cases. However, we can highlight a Conference on Nutrition held in Bukavu in 2016 that brought together policymakers, stakeholders and nutrition experts to discuss the nutritional situation in the whole province. While the DRC has a set of laws related to nutrition and food security (although these laws are no longer adapted to the current context) and has ratified several international treaties and conventions that commit to reducing hunger and food insecurity, the poor application of these legal texts, coupled to the lack of assessment and evaluation of indicators (for example, sustainable development goals) does not guarantee achievement of results.

Given this alarming situation, a number of solutions could be identified, as proposed by various stakeholders, in order to increase the availability, access and utilisation of food to improve nutritional outcomes in the city. Among them, we can list the following: the rehabilitation of national road number 5 (RN5) that connects the city not only to important agricultural production zones but also to other provinces and countries; the development of aquaculture in Lake Kivu, considering the role of this ecosystem and its fish in the nutrition of the population; the formalisation of the informal food economy, considering the importance of this market for the availability and access of food in the city; empowering youth in agriculture production and other related food economic sectors; improving access to drinking water and health services; and the strengthening of the food system by enhancing access to and quality of nutrition centre services, nutritional education, especially among vulnerable groups, and improving stakeholder collaboration. Efforts should be made to enhance the quantity and quality of food in the city. The low food availability and the lack of awareness of healthy eating are compounded by the existence of limiting factors, such as the high cost of healthy food, ongoing conflicts and mineral rush in the region, limited knowledge about the importance of eating healthily, limited resources, a lack of refrigeration in most settlements, and the limited time available for cooking, which depends on the work type and income of the household head, especially women.

However, availability of food and healthy diet could be possible, due to the existence of some positive factors, including the variability of geographical conditions and agroecological zones that can produce food throughout the year, the possibility for some households (especially those in nearby rural areas) to produce their own food, and the important role that women play in nutrition.

Some policy recommendations resulted from the interviews and our analyses:

- Creating a platform that brings together policymakers, state agencies, researchers, hospitals, NGOs, schools and other stakeholders to facilitate access to information on food security, especially a healthy diet, and help policies to put the city's food security front and centre; and if possible, putting in place an inclusive strategic plan (for example, 2025–2035);
- Passing a law that aims to combat land capture and restore previously captured land to farmers (over a 20 to 25-year horizon) to avoid further turmoil;
- Conducting public awareness campaigns on healthy, balanced and diversified diets and the link between undernutrition in childhood and NCDs in adulthood;
- Promoting local agriculture, livestock or aquaculture;
- Targeted training and capacity building for community health workers and volunteers to manage project activities and implementation;
- Advocacy with the provincial government for investment in specific nutrition-sensitive programmes and activities, such as programmes to support breastfeeding, complementary nutrition, access to microcredit, and improved agricultural productivity to minimise nutritional insecurity;

- Training and capacity building for programmes working in nutrition, including the services of the “Office Congolais de Contrôle” (OCC), the “Direction Générale de Migration” (DGM), border control, the services responsible for taxing manufactured products, the “Direction Provinciale de Mobilisation de Recettes” (DPMR), and all services responsible for taxing local products;
- Strengthening the National Nutrition Programme (PRONANUT) by including a specific section devoted to monitoring survivors of undernutrition in the community, including the prevention of NCDs frequently associated with undernutrition;
- Conducting studies to determine the coexistence of the triple burden of malnutrition in these groups with nutritional vulnerabilities in the city;
- Supporting the organisation of monitoring and evaluation of nutritional problems in collaboration with research institutions (universities, schools of public health, faculties of medicine and agronomy), sectoral ministries and partners (UNICEF, FAO and WFP).

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